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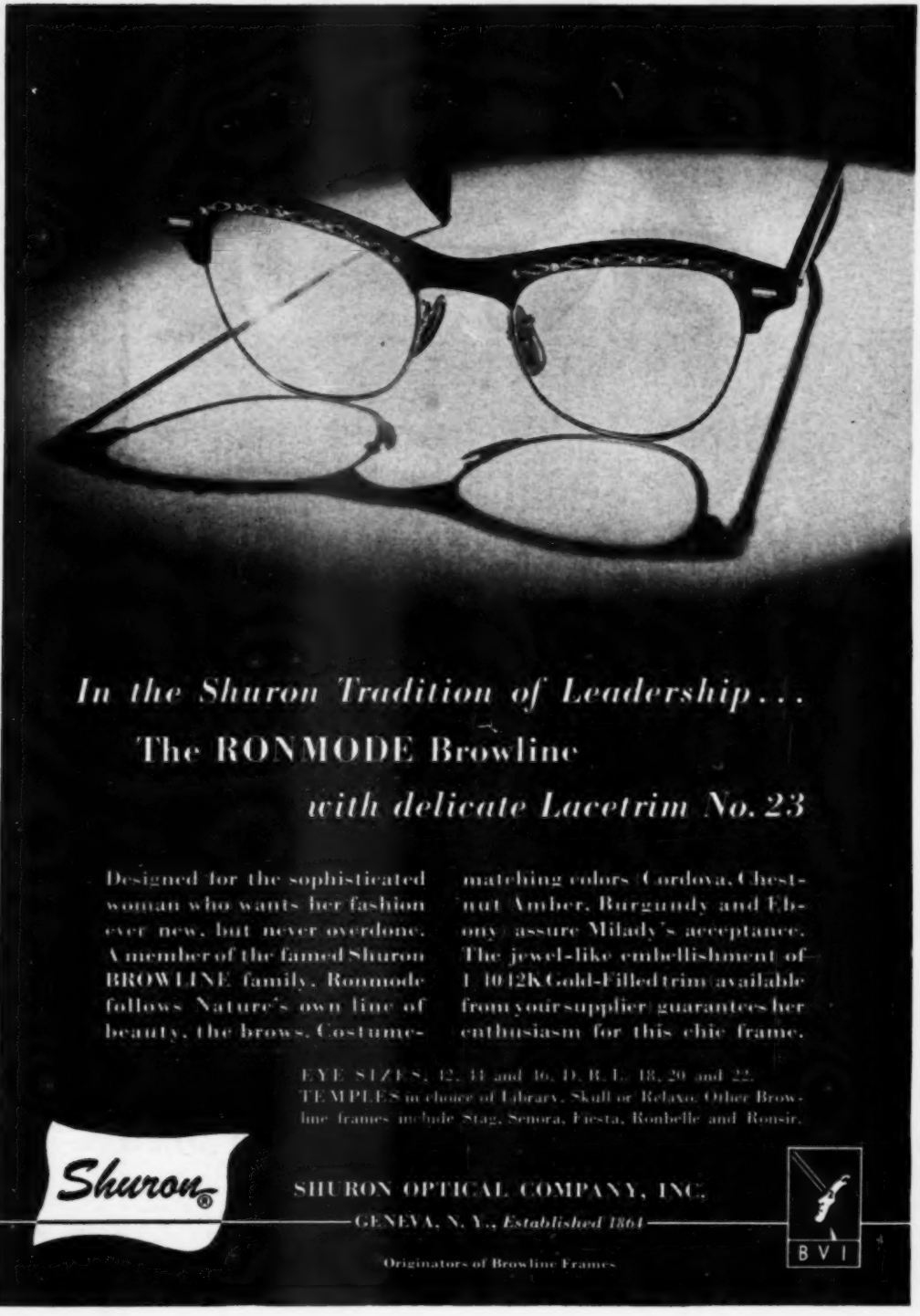
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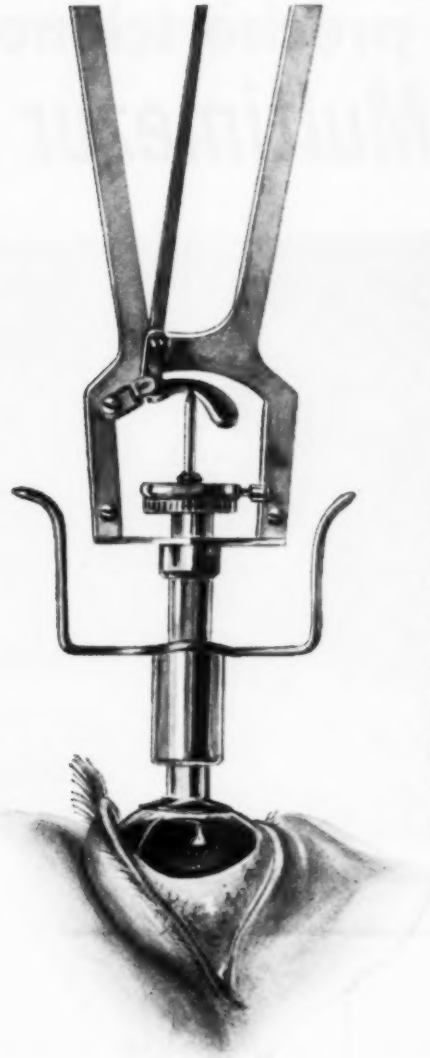

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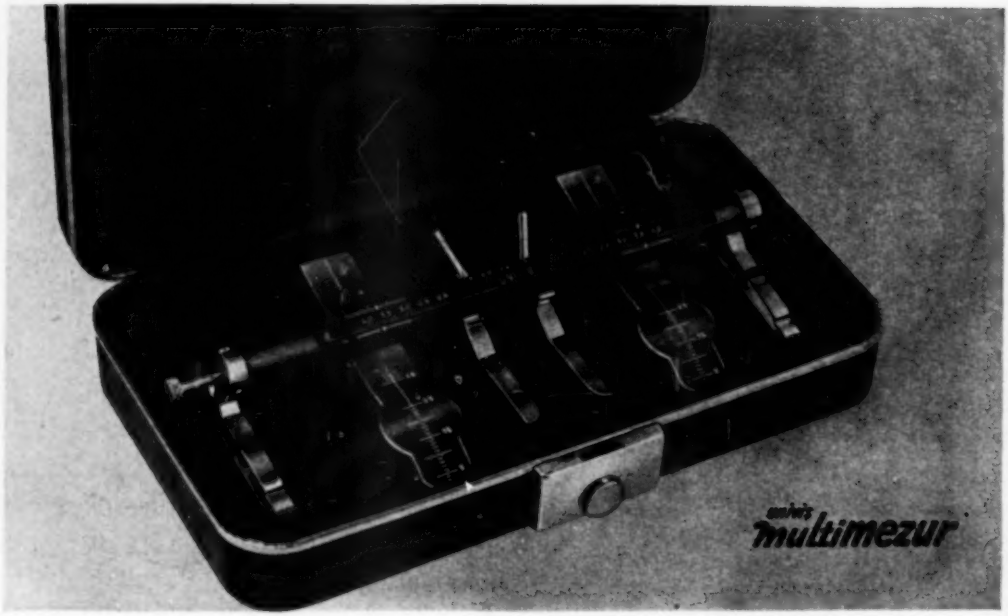

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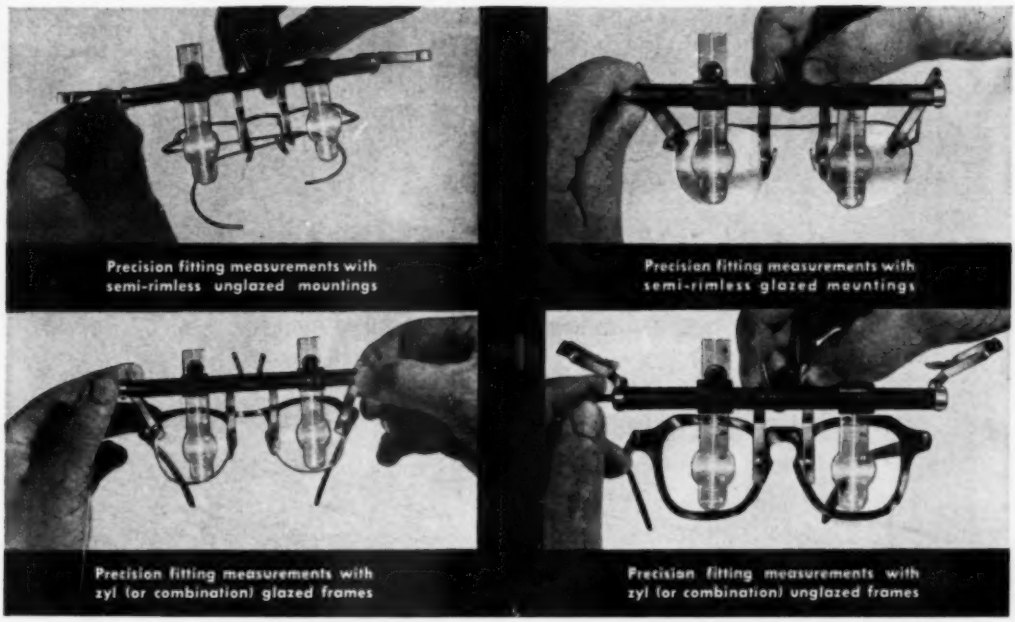
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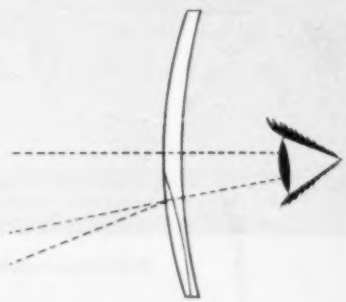

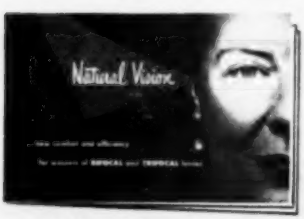

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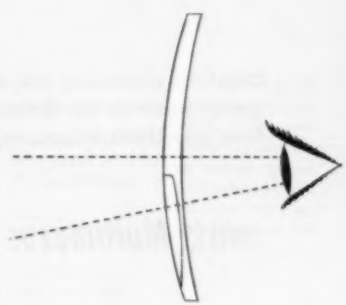

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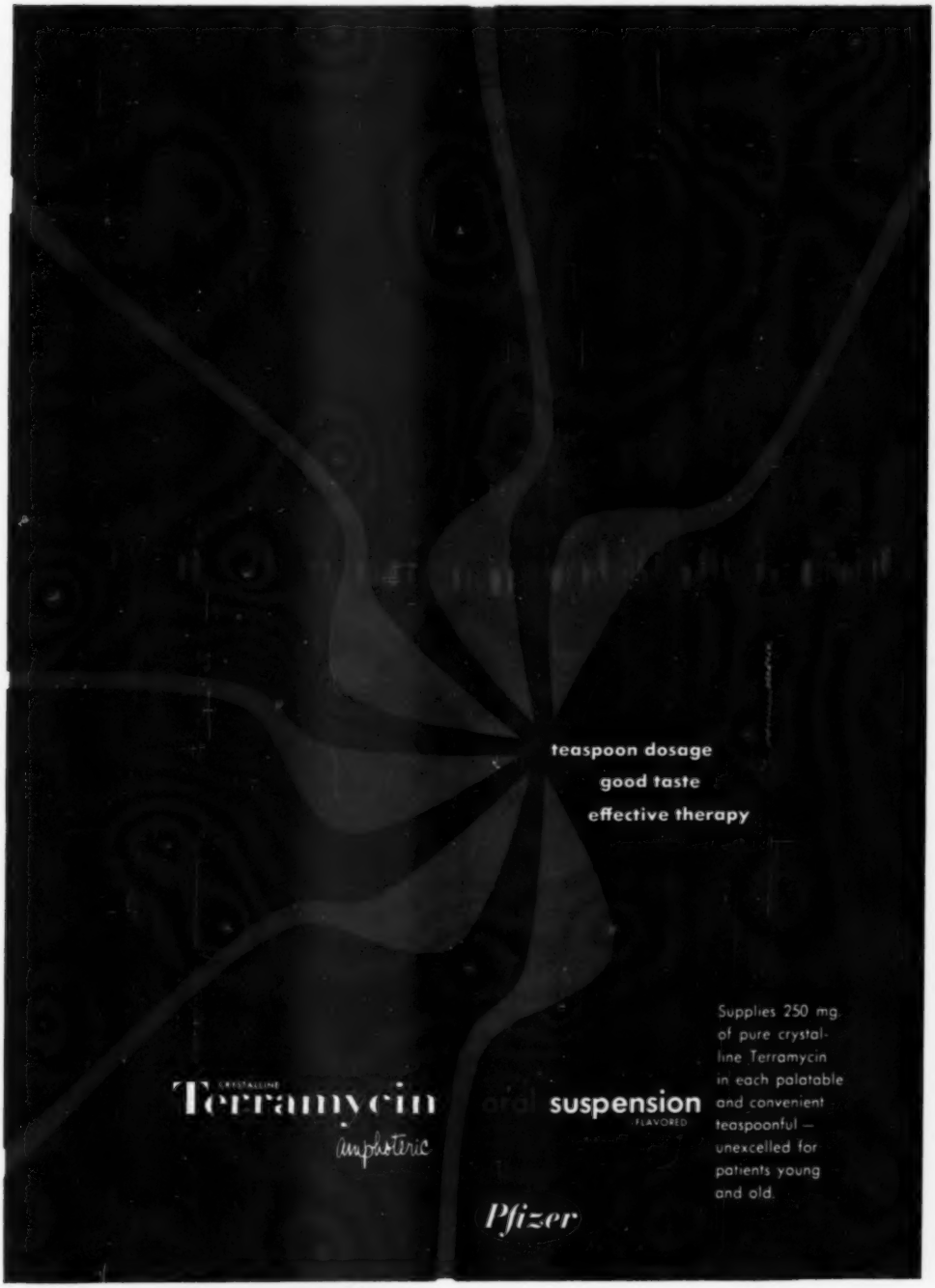

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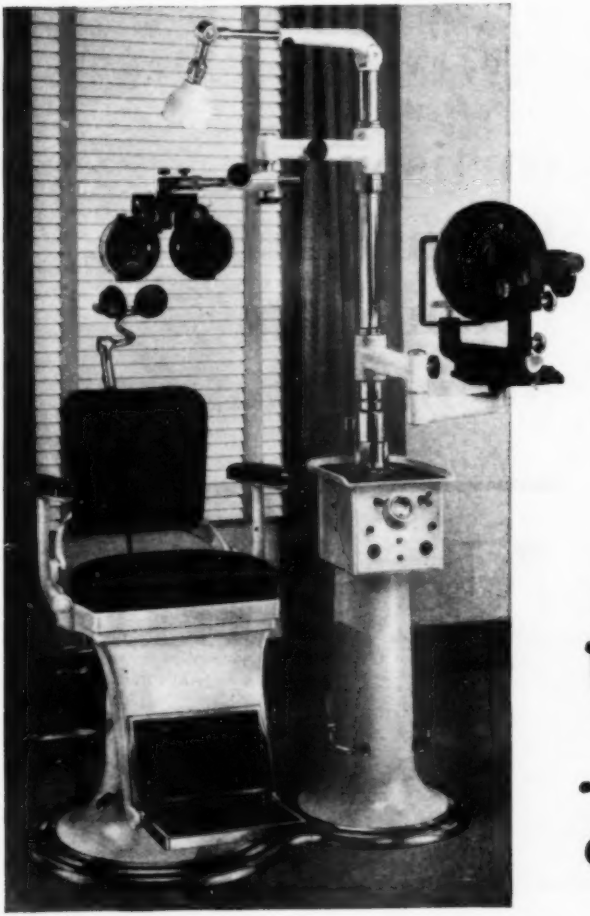

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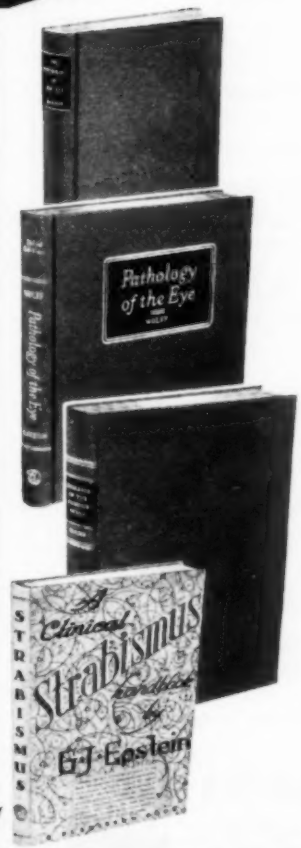

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1. Diehl, K. L.: *Arch. Otolaryng.*, 55:68, Jan., 1952.
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FIG. 2

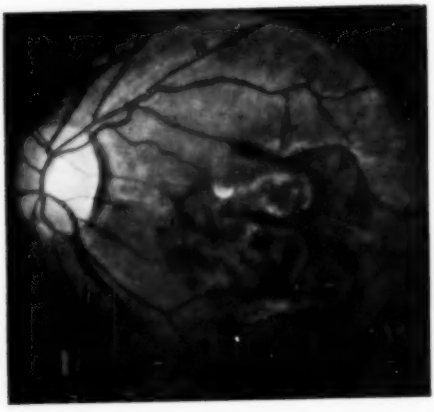

FIG. 3

FIG. 4

FIGS. 2, 3, AND 4 (KLIEN). (FIG. 2) CHORIORETINOPATHY (CENTRAL ANGIONEUROTIC, ACUTE). CASE 2. LEFT EYE. VISION, 10/200. LOBULATED GLISTENING FIGURES WITHIN EDEMATOUS MACULAR AREA. (FIG. 3) CASE 2. LEFT EYE. EIGHT MONTHS AFTER PICTURE SHOWN IN FIGURE 2 WAS MADE. HAD VISION RECOVERED TO 1.2/4. IRREGULAR PIGMENT PROLIFERATION WITHIN FORMERLY EDEMATOUS AREA. (FIG. 4) CHORIORETINOPATHY (CENTRAL ANGIONEUROTIC, SUBACUTE). CASE 3. HISTOPATHOLOGIC FINDINGS: CIRCUMSCRIBED DETACHMENT BY SEROUS TRANSUDATE OF MACULAR RETINA WITH FOVEA CENTRALIS. EDEMA AND CYSTIC DEGENERATION OF HENLE'S FIBER LAYER. DETACHMENT OF INTERNAL LIMITING MEMBRANE (ONLY PARTLY AN ARTEFACT). PROLIFERATION OF PIGMENT EPITHELIUM, CAUSING PIGMENTED SUBRETINAL MOUND. RETINAL AND CHOROIDAL BLOOD VESSELS APPEAR NORMAL. NO SIGN OF INFLAMMATION.

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MACULAR LESIONS OF VASCULAR ORIGIN*

PART II.† FUNCTIONAL VASCULAR CONDITIONS LEADING TO DAMAGE OF THE MACULA LUTEA

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The constitutional common denominator in the group of fundus lesions to be discussed herein appears to be an abnormal functional state of the autonomic nervous system which gives rise, under certain circumstances, to recurrent functional vascular disturbances. The manifestations in the eyeground of the angioneurotic diathesis are of three varieties: (1) Those which indicate a process limited to the retina, (2) those in which participation of the choroid must be assumed from the beginning, and (3) those in which the choroid appears to be, at least at first, the only part affected.

In all three varieties the site of predilection of the lesion is the posterior polar region. Both eyes may be involved simultaneously or successively, but more frequently the process remains limited to one eye.

Young or middle-aged adults, males more often than females, are most commonly affected.

The term most frequently applied to the retinal form of the disease is "central angiospastic retinopathy," first used by Gifford and Marquardt.[1] Synonyms as recorded in the literature are: recurrent central retinitis (von Graefe,[2] E. Fuchs[3]), retinitis centralis (Asayama[4]), central angiospastic retinitis (Horniker[5]), retinal capillaritis (Bailliart[6]), juvenile exudative macular retinitis (Junius[7]), and foveomacular retinitis (Cordes[8]).

The choroidal lesion and its sequelae have been described as chorioretinitis centralis serosa (Kitahara[9]), juvenile disciform macular degeneration (Verhoeff and Grossman[10]), central serous chorioiditis (Riehm,[11] Duggan[12]), and idiopathic flat detachment of the macula (Walsh and Sloane[13]).

In many cases reported by these authors, the lesions seem to have had a combined chorioretinal origin.

The evolution of the angioneurotic concept of the pathogenesis of these conditions was greatly advanced by Horniker's study of 42 cases, in which general and special examinations, particularly entoptoscopy, afforded evidence of marked vasomotor instability in most of these patients. In a few of them, coexistent infections, such as tuberculosis, syphilis, and focal infections, were considered by Horniker as contributory factors in persons with angioneurotic diathesis. The investigations of Bailliart, and Gifford and Marquardt, who added oscillometry and capillary microscopy to the diagnostic armamentarium, support this concept.

Indeed, a great variety of eliciting factors of infectious, (von Graefe,[2] Fuchs,[3]) toxic (Duke-Elder[14]), allergic, endocrine, or metabolic (Gifford and Marquardt[1]) nature may be found in conjunction with the vasomotor lability in some of these patients.

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In other cases none but the constitutional factor is demonstrable, and in still others not even this factor is obvious and an especially sensitive method, as for instance flicker-fusion photometry (Krasno and Ivy[15]) is needed to demonstrate the functional disorder.

1. Central angiospastic retinopathy

The ophthalmoscopic picture

The fresh macular lesion appears cystic. It is round, grayish red, delicately but definitely outlined and elevated. Its size may vary from one to three disc diameters. The foveolar reflex is distorted or absent. The entire lesion may be studded with fine yellowish white flecks of the appearance of Gunn's dots, which seem to be part of the anterior wall of the cyst (fig. 1), and which can be visualized especially well in red-free light.

The content of the cyst may be transparent, permitting a view of the funnel-shaped posterior wall of the cyst. In these cases the impression of a detachment of the internal limiting membrane by clear transudate from the foveal and macular retina is created. In other cases the content of the cyst is slightly turbid.

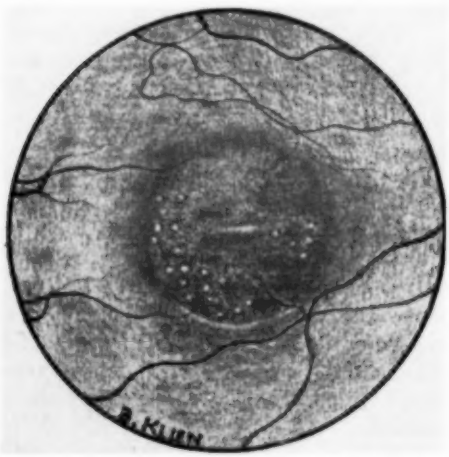

Fig. 1 (Klien). *Retinopathy (central angioneurotic, acute).* Case 1., E. S., a woman, aged 42 years, had blurring of the vision of the left eye by dark area before eye. Vision was: L.E., 0.6+3. Cystic lesion in macula, fine white dots on anterior wall of cyst, distortion of foveolar reflex.

Occasionally one or more small flame-shaped or punctate hemorrhages may lie adjacent to the foveal lesion, indicating a more severe damage to the perifoveal capillary beds. Rarely, hemorrhage seeps into the cyst from the adjacent retina, causing a more serious and prolonged visual defect.

In the more acute stage, spastic blanching or segmentation of some of the perimacular arterioles may be observed (Gifford,[1] Lucie[16]). The large retinal arteries and the optic disc are usually normal.

In the great majority of cases which come to the attention of the ophthalmologist, the lesion is located in the foveal region. It has also been observed, however, in other parts of the posterior polar region and even disseminated in a more peripheral location (Falls[17]). It is possible that the peripheral lesions are more common than it would seem from reports in the literature but go unnoticed since there is no interference with central vision.

During the subacute phase of the disease, the macular cyst flattens and, together with the fine white dots, disappears.

Between the frequent recurrences of these attacks the fundus may appear entirely normal. A long series of such episodes may, however, result eventually in some permanent, if slight, pigmentary disturbances.

The subjective symptoms

The subjective symptoms of the purely retinal central angiospastic attack are minimal, and usually consist of a relative central or paracentral scotoma of the positive type, micropsia, and sometimes metamorphopsia. The visual acuity may be undiminished but objects appear as if seen through yellowish or brownish stained glass.

These episodes develop suddenly and are transient, lasting from several days to a few weeks. They recur in intervals of several weeks or months. The visual disturbance during consecutive attacks may vary in degree

but retains a definite pattern in regard to the position of the fixation point within the scotoma.

Normal visual acuity is usually recovered after each attack, but after many recurrences small absolute negative scotomas may become permanent within the expanse of the original relative scotoma. The vitality of the neuroepithelium and its resistance to permanent damage varies probably in different individuals depending upon their age and general state of health.

It is doubtful whether transient hyperopia occurs in the purely retinal form of the disease. An investigation of the effect of weak convex lenses upon the other, uninvolved eye should never be omitted as it may prove to be similar in the two eyes.

The micropsia and metamorphopsia in the acute retinal form may be due to a wider and irregular separation of the retinal elements by transudate or may possibly be caused by the bulging internal limiting membrane, which, together with the underlying transudate, acts as a convex lens in front of the fovea centralis.

Histopathologic studies of the purely retinal form of angioneurotic disease are lacking so far.

2. Central angiospastic chorioretinopathy

Participation of the choroid in the pathologic process may be assumed if (1) the visual acuity is considerably reduced, (2) pigmentary disturbances appear soon after the onset of the disease, (3) the refraction becomes hyperopic, (4) the lesion is more diffusely distributed over the posterior polar region, and (5) peculiar, silvery figures appear within the lesion.

The ophthalmoscopic picture

The lesion in the combined chorioretinal form may be as small as that of the purely retinal type, but often it is more diffuse, including the perimacular area. It may extend even beyond the course of the large temporal retinal vessels.

Within the yellowish gray discoloration of the posterior polar region, there appears a peculiar pattern of lobulated, glistening figures with moth-eaten outlines (fig. 2), all of which seem to lie at the same level deep in or behind the retina. These silvery figures suggest an interference phenomenon caused by stratified formations, perhaps fluid in thin layers under tissue pressure, possibly between retina and pigment epithelium or even under the pigment epithelium.

Tremendous transudation of fluid may lead to a detachment of the internal limiting membrane with 10 or 12 diopters elevation, which may render the refraction of the eye temporarily myopic by acting as a convex lens in front of the retina. On recession of the edema fine wrinkles in the detached internal limiting membrane at a level well in front of the retina may be observed for some time with the binocular ophthalmoscope.

In general, the elevation of the macular region is more pronounced in the chorioretinal than in the purely retinal form and is produced by varying combinations of detachment of the internal limiting membrane and of the retina itself. Diagnosis of the latter is aided considerably by examination with the slit of the Friedenwald ophthalmoscope.

The subjective symptoms

Absolute paracentral or central scotomas of the negative type reduce the visual acuity to a marked degree early during the attack. Changes of refraction correctible by weak convex lenses may be demonstrable in the early stages of the attack before the visual acuity is too severely reduced, suggesting that at first there may be a detachment of the pigment epithelium from the choroid by transudate. In this event normal contact between pigment epithelium and retina would be retained for a time, although both membranes are pushed forward, producing a relative hyperopia.

Participation of the choroid deprives the attacks of their fleeting character. Although the visual acuity may eventually return to normal, recovery requires weeks or even months and pigmentary disturbances appear soon, especially at the margins of the silvery figures.

Each recurrent attack leaves additional residual pigmentation, which in some cases becomes more pronounced in the lower posterior polar region along a concave demarcation line, suggesting the influence of gravity upon the preceding transudate.

Clinical course

The following case illustrates well the clinical course of the chorioretinal type of central angiospastic disease.

Case 2. F. K., a woman, aged 25 years, entered the eye clinic of Rush Medical College in 1939 with the complaint of sudden impairment of vision in the right eye three weeks prior to this first visit.

Her uncorrected vision was: R.E., 0.2−1; L.E., 1.5−4. There was a 10-degree right paracentral scotoma with the fixation point near its lower border. In the right fundus there was a slightly grayish elevation of the macular area. The macular arterioles appeared narrow and the temporal retinal veins were engorged. The arteries appeared normal. The left fundus was completely normal.

The following day engorgement of the left temporal retinal veins was noted but vision of the left eye was still 1.5. On the third day the fundus of the left eye presented a picture similar to that of the right eye, with macular edema and narrowing of the macular arterioles. Vision of the left eye was reduced to 0.2 and there was also a 10-degree paracentral scotoma in the left visual field.

A general medical history revealed a severe attack of bilateral purulent frontal sinusitis two years before, which was treated at that time surgically and was cleared up after six months.

The patient also gave a history of repeated appearance on various parts of her body of raised irregular itching areas which disappeared within a few hours, and which were diagnosed as urticaria on one occasion. She also suffered constantly from clammy cold hands and feet.

General medical examination at the time of the onset of the ocular disease revealed a purulent pansinusitis. There were no other pathologic findings. The systemic blood pressure was 112/75 mm. Hg. The pansinusitis was treated in the manner customary prior to the advent of antibiotic therapy.

During the two weeks following the initial visit, the vision of the right eye diminished to 4/200 and that of the left to 10/200.

The macular edema in both fundi gravitated downward and became very sharply defined below. Fine wrinkles in the internal limiting membrane could be visualized with the Gullstrand ophthalmoscope far in front of the retinal plane indicating a considerable detachment of this membrane. Silvery irregular figures lying deep in or behind the retina began to appear more distinctly in both posterior polar regions (fig. 2).

In the fundus of the left eye, a hemorrhage, half a disc diameter in size, appeared at the ending of one of the inferior macular arterioles.

The vision began to improve after two weeks, but a myopic correction of −2.0D. in the right eye and −1.25D. in the left, had to be used for maximal vision.

During the fourth week the first pigmentary disturbances appeared at the edge of the edematous retinal zone and somewhat later within it around the silvery figures which had become more glistening and iridescent. The retinal arterioles again had normal caliber.

After six weeks the myopia of the right eye had decreased to −1.0D., corrected vision then was R.E., 0.2; L.E., 1.0. Eight months after the onset of the ocular disease the vision was: R.E., 0.8−3; L.E., 1.2−4. (Figure

3 shows the fundus of the left eye at this time.)

Two and a half years afterward, corrected vision was: R.E., 0.8+3; L.E., 1.2−2; and J1 with either eye. Correction at that time was: R.E., −1.25D. sph. ⌒ +1.5D. cyl. ax. 95°; L.E., −1.0D. sph. ⌒ +0.75D. cyl. ax. 85°.

The glistening pattern and retinal edema had completely disappeared after 12 months. They were replaced by rather heavy irregular pigment proliferation which remained during the last year of observation.

Histopathologic findings

The histopathologic findings in the subacute and healed stages of the chorioretinal form are well illustrated by the following case.

Case 3. C. H., a man, aged 45 years, noted blurring of the vision of the right eye seven weeks prior to the enucleation of this eye. The eye was removed because of the incidental coexistence with the chorioretinopathy of a nevus of the choroid in the paramacular region, which, in view of the acute and progressive visual disturbance, was interpreted as an early malignant melanoma of the choroid.

The initial clinical examination revealed a reduction of the visual acuity of the right eye by a negative paracentral scotoma to 0.4−2. The vision of the left eye was normal. General physical examination was negative.

During four weeks of observation prior to enucleation, the scotoma in the right central field increased in size, resulting in further loss of vision.

In the right fundus there was, below and temporal to the macula, a well-defined, dark gray area, one disc diameter in size, which appeared slightly elevated. The macular retina was edematous and there were a few punctate hemorrhages below the fovea centralis. A few small drusenlike yellowish areas were scattered over the periphery of this fundus.

In the fundus of the other eye there was one quiescent yellowish area of chorioretinopathy with moderate pigment proliferation in the inferior nasal paramacular region.

Histopathologic study of the enucleated right eye revealed, in addition to a benign nevus of the choroid and scattered drusen of the choroid in the fundus periphery, a subacute process in the foveolar and macular area, and an old quiescent focus inferior and nasally to the macula.

The subacute lesion (fig. 4). The foveolar and immediately adjacent area of the retina were edematous. Just temporal to the fovea there was a cystic space in Henle's fiber layer. A corresponding small area of the neuroepithelium was completely destroyed. The internal limiting membrane was detached from the nerve-fiber layer over the entire macular region, partly artificially, partly by a pale pink, finely granular coagulum. There was one small hemorrhage in the nerve-fiber layer below the fovea centralis.

The foveolar area was raised by a small amount of subretinal serous transudate. Temporal to the fovea there was a mound of proliferated pigment epithelial cells, most of which were deeply pigmented and of typical shape. A small number of them were spindle-shaped and had lost most of their pigment content.

Bruch's membrane was completely intact and the choroid behind the macular lesion was normal. Both retinal and choroidal vessels appeared to be normal.

The quiescent lesion (fig. 6). Nasally and below the macula there was a subretinal mound, about one-half disc diameter in size, which was lying almost entirely between Bruch's membrane and pigment epithelium. It was composed partly of proliferated and degenerated pigment epithelial cells, recognizable by their pigment content, and partly of very elongated cells of the appearance of fibroblasts, which were especially numerous along Bruch's membrane, suggesting a choroidal origin. No dehiscence of Bruch's membrane could be demonstrated, but according to

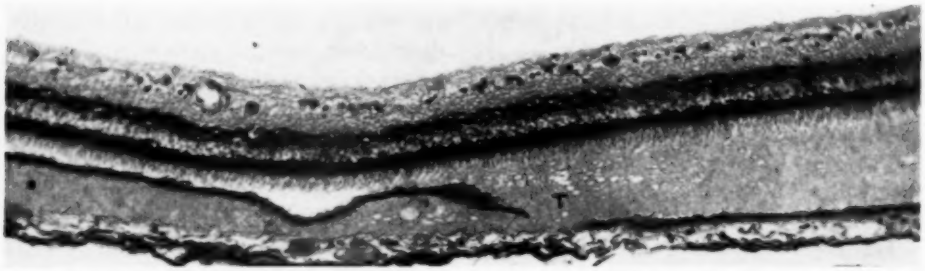

Fig. 5 (Klien). Transudation from choroid in case of malignant melanoma illustrating the resulting detachment of pigment epithelium and retina. (T) Tear of pigment epithelium.

Verhoeff, cells may penetrate Bruch's membrane without producing microscopically visible breaks. This possibility is also suggested by a small focus of lymphocytes which was bisected by the membrane. The cells on the inside of the membrane must have come from the choroid through the apparently intact membrane, since the mound did not contain blood vessels. Much of the newly formed subretinal tissue had a homogeneous, hyalinized appearance. There was complete destruction of the first retinal neuron over it.

The choroid behind this old lesion was fully preserved and, aside from a few small nonspecific foci of lymphocytic infiltration, appeared normal. Since the foci of infiltration were limited to the old lesion and were completely missing in the subacute process they do not point to an inflammatory origin of the disease.

The essential features which characterize the histologic picture of the subacute stage of this type of chorioretinopathy are coexisting extravasations from the paramacular retinal vessels and from the choriocapillaris of the posterior polar region, and irritative proliferation of the pigment epithelium. Signs of inflammation are completely absent.

The extravasations in this case were largely serous, complicated by only one small retinal hemorrhage, but they could conceivably be mixed with hemorrhage or be altogether hemorrhagic.

The immediate consequences of serous transudation from the perimacular retinal vessels are edema of Henle's fiber layer and a detachment of the internal limiting membrane. Those of choroidal extravasation, which may find their way through an intact membrane of Bruch by diapedesis, are a detachment of the pigment epithelium and/or of the retina (fig. 5).

The late effects of recurrent or prolonged serous retinal transudation are cystic degeneration with more or less extensive destruction of the neuro-epithelium.

Voluminous hemorrhagic extravasation from the perimacular vessels, which seldom occurs in the angiospastic disease, may result in subretinal fibrous mounds if cysts filled with blood rupture toward the subretinal space. Such mounds, which characterize, for instance, the advanced stages of circinate retinopathy, usually contain new capillaries, which are derived from the retinal perimacular capillary beds.

The end results of serous or hemorrhagic extravasations from the choroid, unless promptly reabsorbed, are also subretinal mounds, resulting from proliferation of pigment epithelial cells and organization of the extravasated material by fibroblasts from the choroid. These mounds may be avascular or, as those of the Kuhnt-Junius disciform degeneration, contain new vessels after breaks in Bruch's membrane have led to herniation and new formation of capillaries from the choroid.

Irritative proliferation of the pigment epithelium could conceivably occur also in the course of purely retinal transudation after destruction of a few neuro-epithelial elements. In that case intraretinal fluid may reach the subretinal space through the open perforations of the external limiting membrane formerly occupied by a rod or cone. Residual pigmentation after many attacks of angiospastic retinopathy, during which the visual acuity was never appreciably reduced, may have this origin. Such residual pigmentation need not be permanent, but may change in intensity or size or disappear altogether.

Comparison of the histologic pictures of the subacute and old lesions in our case reveals the transformation of deeply pigmented proliferated epithelial cells into faintly or nonpigmented elongated cells resembling fibroblasts. Accumulations of such degenerated cells would no longer be clinically visible as pigment deposits, but, if at all, as grayish or yellowish flecks at the site of the former pigmentation.

Comment

Judging from the limited histopathologic observations in this case, the amount of residual findings and the degree of recovery from an attack of functional chorioretinopathy must depend upon the duration of the attack and the type and predominant location of the extravasation, perhaps also upon the age of the patient.

An entirely intraretinal transudate or a transudate from the choroid which has merely accumulated between Bruch's membrane and pigment epithelium, should have the best prognosis, since in an otherwise healthy retina or choroid the vascular system should be capable of reabsorbing the escaped fluids within a reasonably short time, before permanent damage of the tissues has resulted.

If, on the other hand, the extravasation should reach the subretinal space, the chance for rapid absorption is considerably diminished, especially in older individuals, and irritation of the pigment epithelium with its multitude of irritative responses may produce permanent lesions in a relatively short period.

Clinical differential diagnosis

While the purely retinal form of the disease with its persistently good visual acuity and numerous short-lived recurrences is not easily mistaken for another condition, the mixed chorioretinal form, in the acute as well as in the quiescent stage, has to be differentiated from two other processes, namely, central chorioretinitis and heredodegeneration of the macula.

It is often impossible to distinguish between an acute central chorioretinitis and an acute central angiospastic chorioretinopathy, especially if the lesion is small. Marked turbidity of the retinal edema, giving the retina an opaque gray appearance, suggests an inflammatory process, while a detachment of the internal limiting membrane in cyst form by a transparent or semitransparent fluid and the presence of silvery glistening figures in the deeper layers, visible through an edematous but still transparent retina, speak for the functional condition.

Old residual lesions from a central chorioretinitis tend to be associated with a much more severe diminution of vision than the residual lesions of the functional process, which may show surprisingly little interference with central vision in spite of considerable pigmentary changes (fig. 6).

Atrophic areas, showing exposed sclera within a macular scar, exclude an angiospastic origin of the lesion since there is no destruction of the choroid associated with the functional process.

Certain stages of heredodegeneration of the macula produce pictures closely resembling those of central angiospastic chorioretinopathy. The history of the hereditary or familial occurrence of the macular disease

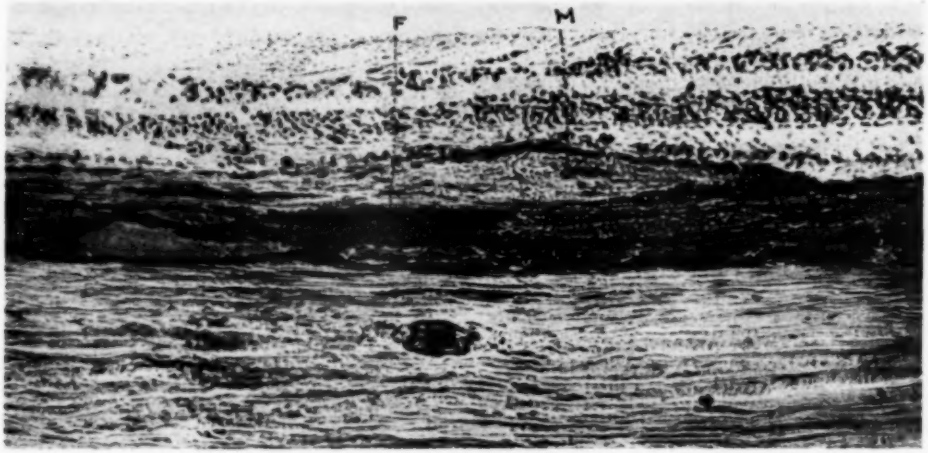

Fig. 6 (Klien). *Chorioretinopathy* (old lesion). Case 3. (M) Subretinal mound of proliferated and degenerated pigment epithelial cells and fibroblasts. (F) Focus of lymphocytes. Bruch's membrane and choroid intact.

is perhaps the most important single feature in the differential diagnosis of these two conditions. The degenerative process is, furthermore, invariably bilateral. In macular degeneration the visual acuity does not fluctuate and there is frequently a striking discrepancy between the severity of the visual disturbance and the relatively mild ophthalmoscopically visible alterations.

3. Central angioneurotic choriopathy

The term "idiopathic flat detachment of the macula" used by Walsh and Sloane[15] best describes this condition. The complete lack of organic vascular changes and the absence, clinically as well as histologically, of inflammatory signs and of other pathologic processes, which could produce such profuse serous and occasionally hemorrhagic extravasations from the choroidal vessels, suggest the functional nature of this disease. As in the retinal and chorioretinal form, the immediate eliciting factors may be of diverse nature and remain often completely obscure.

The special differentiation at the posterior polar region of the vascular bed of the choroid with its uncommonly wide capillary lumina may account for the limitation of the process to this region.

The ophthalmoscopic picture

The macular retina is elevated and may appear much darker than normal. The narrow beam of the Friedenwald ophthalmoscope may reveal beyond doubt a circumscribed retinal detachment by transudate, provided that the fluid is not too turbid and is accumulated between pigment epithelium and retina. If the transudate remains largely behind the pigment epithelium, or if it is turbid or mixed with hemorrhage, the picture of a malignant melanoma of the choroid may be simulated, as in the cases of Verhoeff and Grossman, Lucic, and the one illustrated in Figure 7.

There may be little or no collateral edema of the overlying or adjacent retina even in the acute stage, which aids in ruling out an inflammatory condition, but adds to the difficulties in the differential diagnosis from an early malignant melanoma of the choroid.

Chronic lesions of this type often become darker all over or in spots and may increase somewhat in size, but at the same time become more sharply defined. This increasing

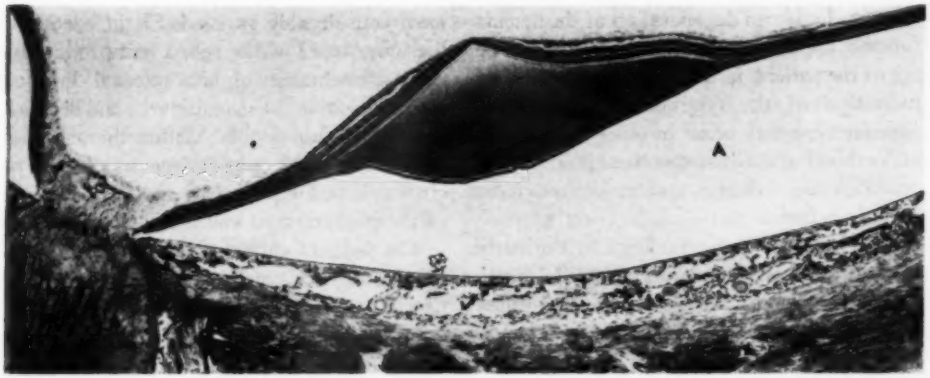

Fig. 7 (Klien). *Choriopathy* (central angioneurotic, acute). Case 4. Right eye. Vision 3/200. Histopathologic findings: Circumscribed detachment of macular retina. (A) Artificial detachment of pigment epithelium. Bruch's membrane intact, choroid normal.

distinctness of outline speaks against the presence of a malignant melanoma. Later, light yellowish areas may appear within the lesion (Lucic,[16] Adler[19]).

Subjective symptoms

In the purely choroidal form of the neurovascular disease, the central scotoma, which causes the early and pronounced diminution of vision, is of the negative type. It is often larger for blue than for red or white test objects and tends to be permanent.

During an initial period of varying length the visual disturbance may, however, consist mainly of micropsia, metamorphopsia, and an acquired hyperopia with relatively good central vision, indicating a detachment of the pigment epithelium rather than of the retina in the beginning of the exudative process.

In other cases the vision is considerably impaired from the beginning by a large absolute central scotoma.

The prognosis of the purely choroidal form of the disease is much less favorable than that of the retinal form because of the more severe and usually permanent damage to the neuro-epithelium by the subretinal extravasation, and because of its resemblance to an early malignant melanoma of the choroid, which leads to removal of the eye in a certain percentage of these cases, especially in the middle-aged group of patients.

Histopathologic findings

Histopathologic studies of the subacute and chronic stages of this choroidal disease have been made by Verhoeff and Grossman,[10] Lucic,[16] and Maumenee.[20]

The histologic picture of the early stage is characterized by extravasations from the choriocapillaris of serous or hemorrhagic character, which accumulate underneath the pigment epithelium and/or the retina. Organic changes of the choroidal blood vessels are either absent or insignificant and inflammatory signs are missing.

The residual findings in the advanced stage of the process include fibrous, subretinal mounds, often still partly covered with pigment epithelium, and defects in Bruch's membrane, a picture indistinguishable from senile disciform macular degeneration. At this stage, small foci of round-cell infiltration may be scattered through the choroid behind the lesion.

There may be a sliding transition from the functionally produced extravasations to those caused by organic vascular disease, a consideration which led Verhoeff to the term of

juvenile disciform degeneration of the macula for the apparently functional process. The age of the patient, is, however, not an absolute indication of the type of lesion and the juvenile type may occur in older individuals, as Verhoeff and Grossman have pointed out, provided the vascular system is free from organic defects.

The histopathologic findings in the early stage of the predominantly choroidal form of vasoneurotic macular disease are illustrated by the following case.

Case 4. E. A. D., a man, aged 52 years noted diminution of vision of the right eye and right micropsia for the first time three weeks prior to removal of the right eye. In the beginning, objects also had appeared darker when viewed with the right eye.

Migrainelike headaches after ingestion of certain foods had increased in frequency and severity in recent weeks. There was no other history of illness. The general physical examination was negative.

At the time of the first examination, one week after the apparent onset of the disease, the vision of the right eye was reduced to 3/200 by a large negative central scotoma. The vision of the left eye was normal.

In the macula of the fundus of the right eye, there was an elevation of three diopters and a slate-gray discoloration, measuring about 1.5 disc diameters. The inferior sloping edges of the raised area had a lightly mottled appearance and there were concentric folds of the retina around it. The optic nerve appeared normal.

The eye was removed because no definite assurance could be gained during two weeks of observation that the detachment of the macular retina was not produced by an incipient malignant melanoma of the choroid.

The histopathologic findings consisted of a circumscribed detachment of the macular retina by a serous transudate (fig. 7). There was an almost complete degeneration of the neuro-epithelium within this region, and the outer nuclear layer and Henle's fiber layer were considerably rarefied. Slight edema of the inner layer of the retina had produced a wavy detachment of the internal limiting membrane over the macular area and between it and the optic papilla. Within the temporal half of the optic papilla one small area of circumscribed edema had caused distortion of the glial columns and nerve-fiber bundles.

The pigment epithelium was intact and adherent to Bruch's membrane everywhere. The choroid appeared entirely normal.

Comment

The extensive destruction of the first retinal neuron suggested a process of somewhat longer duration than was realized by the patient, and indicated the poor prognosis regarding visual recovery in this case, even if the eye had not been removed. One may, however, only speculate upon the clinical and histologic appearance of the lesion a few years hence.

It is not known why transudation from the choroid leads, in some instances, first to a detachment of the pigment epithelium and, in others, immediately to a detachment of the retina. The constituents of the subretinal mounds, which are the end results of the disease in either case, seem to differ with these two different patterns of behavior of the pigment epithelium.

The detached pigment epithelium has a tendency to tear (fig. 5) or become fragmented and is less likely to proliferate than the epithelium which remains in contact with Bruch's membrane. In these cases the cells of the subretinal mass seem to be derived mainly from the choroid. As Verhoeff and Grossman[10] have shown, fibroblasts, obviously coming from the choroid through microscopically invisible openings in Bruch's membrane, may form an avascular layer on the inside of this membrane at an early stage of the disease.

It is not impossible that continued proliferative activity in this location may lead to visible dehiscences in Bruch's membrane with

prolapse of capillaries and repeated transudation and hemorrhage, setting up a vicious circle of extravasation and organization, which would result in a fibrous mound, vascularized from the choroid, such as characterizes disciform macular degeneration.

If, on the other hand, the transudate accumulates between retina and pigment epithelium without first detaching the latter, irritative proliferation of the pigment epithelium with subsequent degeneration of the proliferated cells represents for a long time the sole source of cellular constituents of the subretinal mass (fig. 4 and fig. 6).

Clinical differential diagnosis

Three conditions have to be differentiated from this choriopathy, namely, central chorioretinitis, disciform macular degeneration (Kuhnt-Junius), and early malignant melanoma.

A marked degree of opaque gray, collateral, retinal edema suggests an inflammatory process. The presence of a deep subretinal hemorrhage adjacent to the lesion does not rule out an inflammatory focus, but if it is fairly well visible through transparent retina, it speaks in favor of either the vasoneurotic process or the disciform degeneration and definitely against a tumor, because hemorrhages are not as a rule associated with incipient malignant melanomas of the choroid.

It may be impossible to make the differential diagnosis between a hemorrhagic functional choriopathy and a disciform macular degeneration unless the lesion occurs in a young individual and remains confined to one eye, in which case it suggests the functional condition. The disciform degeneration is always eventually bilateral although the lesion in one eye may be more advanced.

Deep subretinal hemorrhages are very dark gray or brown in color and may not always be easily recognized as such on the first examination. Careful observation, on subsequent examinations at short intervals, of change in outline and position of the dark area, brought about by the effect of gravity upon the hemorrhage, will usually reveal its true nature.

Without associated hemorrhage the functional choriopathy is difficult to differentiate from a retinal detachment due to a small malignant melanoma. An initial period of relatively good vision after visual disturbances have started, revealed by a carefully taken history, general signs of vasoneurotic diathesis, and a young age of the patient may prejudice one in favor of the functional condition.

A central symmetrical location of the foveolar reflex which remains so during a period of observation in spite of a slight enlargement of a nonhemorrhagic lesion also suggests the functional process, because tumors do not usually grow evenly in all directions.

In most of these cases it will be, however, at the discretion of the individual physician how long the period of observation should be extended if no definite clue can be obtained ruling out a tumor.

In the foregoing case reports the vascular lesions of the posterior segment had a systemic background, the other parts of the eye being unaffected. The following report is presented as a case in which severe inflammatory changes in the anterior segment were associated with similar macular lesions. These lesions were not observed clinically because of the catastrophic nature of the disease of the anterior segment.

Case 5. A man, aged 55 years, suffered from a deep keratitis and anterior uveitis of his left eye for a year prior to removal of this eye. A secondary glaucoma developed at some time during that year and an iridectomy was performed five weeks before enucleation.

At the time of enucleation the vision of the left eye was light perception.

A dense leukoma with abundant deep and superficial vascularization had replaced the entire cornea. Tactile tension was markedly increased.

The other eye was normal.

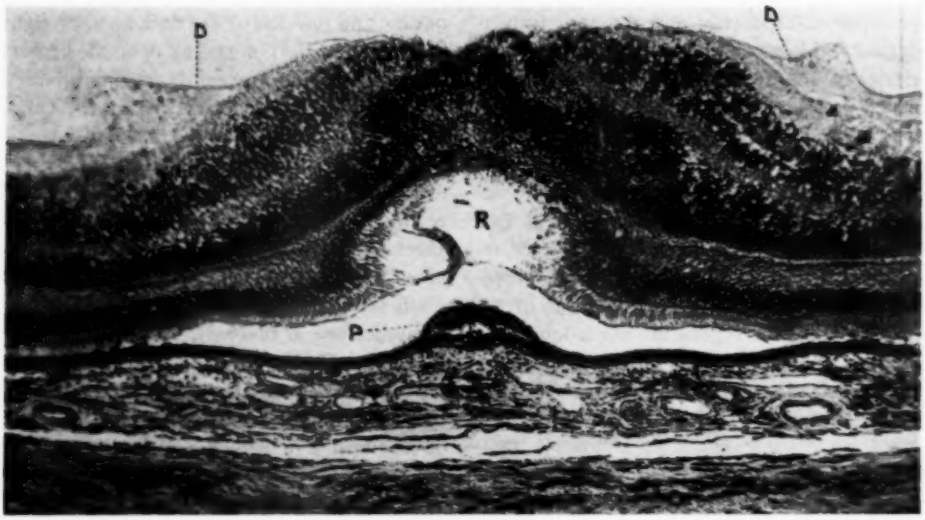

Fig. 8 (Klien). Case 5. Macular lesion resembling those of functional origin in eye lost from complications of granulomatous keratitis and anterior uveitis. (D) Detachment of internal limiting membrane. (R) Circumscribed destruction of neuro-epithelium. (P) Knoblike proliferation of pigment epithelium. Clinically, cloudy swelling of the macula often accompanies inflammatory foci elsewhere in the eye.

Histopathologic examination of the left eye revealed a deep keratitis with replacement of extensive portions of the cornea by specific granulomas composed of round cells, epithelioid and giant cells and a chronic, infiltrating anterior uveitis.

There was considerable atrophy of the prelaminar portion of the optic nerve and a moderate retrodisplacement of the cribrous plate.

The macular retina (fig. 8) was slightly distorted by edema. In the fovea and in the immediately adjacent region there was a circumscribed detachment of the retina and degeneration of the neuro-epithelium. Proliferation of the pigment epithelium had produced a knoblike excrescence in the foveal area.

The choroid was normal, Bruch's membrane completely intact. The retinal and choroidal blood vessels appeared to be normal.

This macular lesion, incidentally found in an eye with an anterior uveitis and a granulomatous keratitis and of similar appearance to those of angioneurotic origin already discussed herein, is demonstrated with the suggestion that functional vascular disturbances in the retina or choroid could also be secondary to toxic or infectious foci within the eye itself. One might think of such an event in a sudden deterioration of vision for which no other cause can be found in eyes with diseases of the anterior segment.

Conclusions

It is primarily on the basis of pathogenesis and pathology that the macular lesions of vascular origin may be divided into functional and organic groups.

In the functional even as in the organic group there are cases in which permanent visual defects and objective changes occur.

On the other hand, in the organic type there are cases in which complete recovery of vision takes place and less often complete resolution of the objective changes occurs, as has been discussed elsewhere.

Division of these macular lesions into the functional and organic groups has significance in terms of the therapeutic approach. It should aid in the evaluation of the action of a number of therapeutic agents of recent origin.

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Ophthalmic Miniature

I am very sorry, Pyrophilus, that to the many difficulties which you may meet with, and must therefore surmount, in the serious and effectual prosecution of experimental philosophy I must add one discouragement more, which will perhaps as much surprise as dishearten you; and it is, that besides that you will find many of the experiments published by authors, or related to you by the persons you converse with, false and unsuccessful. You will meet with several observations and experiments which, though communicated for true by candid authors or undistrusted eye-witnesses, or perhaps recommended by your own experience, may, upon further trial, disappoint your expectation, either not at all succeeding constantly, or at least varying much from what you expected.

Robert Boyle, *Concerning the Unsuccessfulness of Experiments*, 1673.

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LUDWIG VON SALLMANN, M.D.
New York

EDITORIAL NOTE: From time to time, during the year, there will appear articles in honor of Prof. Karl D. Lindner who has reached the age of 70 years. At the end of the year, the papers will be collected and, together with those appearing in other journals, will be suitably bound in a "Festschrift" to be presented to Professor Lindner.

Prof. Karl D. Lindner was born in Vienna on January 19, 1883. He attended the medical school at the University of Vienna, studied in Paris in the winter of 1905-1906, and took his degree in Vienna in 1907. His ophthalmologic training was obtained at the eye clinic of Prof. Ernst Fuchs.

For fundamental investigations on trachoma, he was granted the Welz-Graefe Award for 1911-1913 by the German Ophthalmological Society in Heidelberg. In 1916, he assumed the duties of University Lecturer for Ophthalmology at the University of Vienna. He was at this time Professor Fuchs's assistant and, after Professor Fuchs's retirement, became Professor Dimmer's assistant.

In 1924, he was put in charge of the ophthalmologic section at the "Poliklinik" in Vienna and later in the same year was appointed associate professor. As Professor Dimmer's successor he became director of the Second University Eye Clinic in 1927 and professor in 1928. For the year 1948-1949, he was dean of the Medical School.

Professor Lindner is a member of the Vienna Ophthalmological Society, the German Ophthalmological Society in Heidelberg, and the "Gesellschaft der Ärzte" in Vienna. His scientific papers are concerned with many phases of ophthalmology. In addition to the monograph entitled *The Determination of Astigmatism by Means of Retinoscopy with Cylinders* (1927), and the chapters on trachoma in both editions of the textbook, *The Eye and Its Diseases* by Berens, he has published 115 articles.

Deserving of special mention are his contributions dealing with trachoma, several basic studies on the topography of the microorganisms of the conjunctiva, and a series of publications on the determination of astigmatism by means of retinoscopy with cylinders and by means of such subjective methods as velanoskiascopy and the use of cross cylinders.

Another series of important papers are those dealing with the pathogenesis and treatment of retinal detachment, the elaboration of the Leber-Gonin theory of the development of retinal tears, the introduction of the "Lochbrille," the demarcation method, the undermining operation, and the scleral resection.

In 1952, Professor Lindner's *Textbook of Ophthalmology* appeared. It embodies the results of his extensive scientific achievement and, in the manner of its presentation, is an expression of his experience as a great teacher.

THE CONTRIBUTION OF THE VIENNA SCHOOL TO OPHTHALMOLOGY*

A. PILLAT, M.D.
Vienna, Austria

Yesterday, on June 21, 1951, the 100th anniversary of the birth of Ernst Fuchs, which had occurred on June 14th, was celebrated by transferring his marble relief, created by Professor Müllner's master hand, from my auditorium in the 1st University Eye Clinic, where it had been kept since 1921, to the Arcade of the University of Vienna, where the stone images of so many illustrious men of science can be found.

On the occasion of this combined gala meeting of the Society of Physicians and the Ophthalmological Society of Vienna in honor of Ernst Fuchs, it may be permitted to give a brief historical review of the development of ophthalmology in Austria in the 19th century, and to enumerate to our contemporaries what the Ophthalmological School of Vienna contributed to modern ophthalmology.

In 1812, the University of Vienna was the first university to create a separate chair for ophthalmology. Georg Josef Beer was made associate professor and head of the eye clinic in the Allgemeines Krankenhaus. The 1st Eye Clinic is located in the same rooms, though in an enlarged form, to this very day.

Up to 1812, ophthalmology was considered an appendix to anatomy, internal medicine, or surgery. It was taught and cultivated only to the extent of the professor's interest in the subject. For instance, during the last quarter of the 18th century, ophthalmology was taught by Josef Barth, anatomist of the University of Vienna and a cataract surgeon, as stated in the degree: " . . . in consideration of his possessing particular dexterity in diseases of the eye, operations on the eye, and its more minute anatomy." In 1773, on the suggestion of van Swietens, Barth had been appointed professor for anatomy and ophthalmology by Maria Theresa.

Josef Beer was a disciple of Barth who, however, appreciated him merely as a capable draughtsman of anatomic specimens.

Fig. 1 (Pillat). Ernst Fuchs.

Barth did not encourage him in any way when Beer approached him for training in ophthalmology. Therefore, after seven years, Beer separated from Barth, and studied ophthalmology on his own with an iron energy. In 1802, he established himself as privat dozent, and, though self-taught, soon was in great demand as an oculist and a teacher in his specialty.

* From the 1st University Eye Clinic (Director: Prof. Dr. A. Pillat). Presented at the gala meeting of the Medical Society of Vienna on the occasion of the 100th anniversary of the birth of Ernst Fuchs, June 22, 1951. A translation by Stefan Van Wien, M.D., Chicago, of an original article in the *Wiener Klinische Wochenschrift*, **63**:614-617, 1951, with the permission of the Springer-Verlag, publishers.

Fig. 2 (Pillat). Georg Josef Beer.

Beer (born in Vienna in 1763) was appointed professor for ophthalmology in 1812. An eye clinic consisting of two rooms, each equipped with eight beds and an operating room that served simultaneously as library and class room, was made available to him. This same year was the year of the birth of modern clinical and scientific ophthalmology.

Beer, animated by love for his specialty, was the first teacher of a five-hour course in practical and theoretical ophthalmology extending through the two semesters of the fifth year of medical school; he was an extraordinarily skilled surgeon and a sympathetic physician to his sick.

The early creation of a chair for ophthalmology by the Emperor of Austria and a five-hour course for two semesters together with the energy and capability of a man like Beer formed the foundation for the Ophthalmological School of Vienna. For that reason, Hirschberg, in his monumental historical work, refers to Beer as "the father of ophthalmology."

The most outstanding oculists of the next generation were Beer's disciples, among them being C. F. Graefe, J. N. Fischer, Langenbeck, Chelius, Ammon, Friedrich Jäger, Fabini in Hungary, Flarer in Pavia, W. MacKenzie in Glasgow, and Frick in Baltimore.

Josef Beer's scientific contribution in 1799 was the first actual description of a method for extracting the cataract in its capsule, thus consciously avoiding the formation of a secondary cataract. He performed this operation routinely, reported it, and recommended its use.

It is true that A. G. Richter had already recommended intracapsular lens extraction in 1776. However, he soon gave it up for, in his principal publication about the cataract, appearing in 1790, he doesn't even mention this procedure.

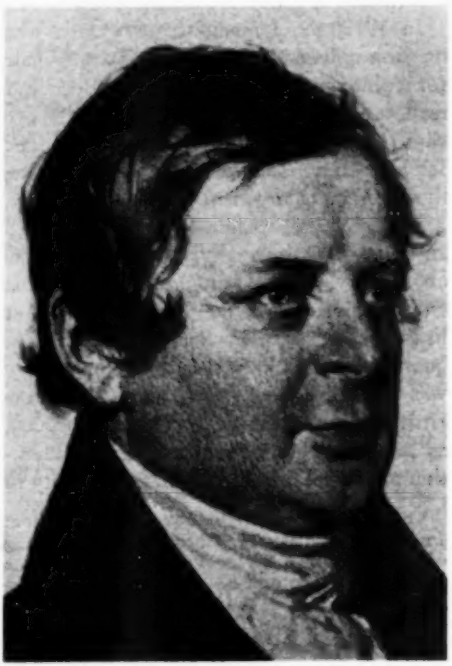

Fig. 3 (Pillat). Anton von Rosas.

Iridectomy as the method of choice for creation of a new pupil dates back to Beer. Beer was first to describe gonorrheic blennorrhea in detail, and to recommend the use of the lapis divinus. Also, he called attention to the great value of mercury treatment in ophthalmia syphilitica.

In 1818, Beer was made full professor for ophthalmology but, in 1819, had to give up his chair and his practice because of a stroke. He died in 1821.

Beer's disciple, Anton Rosas, was appointed his successor in 1821. Born in Pecs, Hungary, he had been professor for ophthalmology at the University of Padua since 1819. Rosas' main work was his big textbook in three volumes on theoretical and practical ophthalmology, noted at that time as the most complete summary of the specialty. He was very conservative in his clinical activities and ill disposed toward the advances in microscopic anatomy. An excellent surgeon and teacher, he was head of the clinic until 1855. He had the surgeon, J. N. Hofmayr, make the beautiful wax models of some eye diseases that are still preserved in the auditorium of the 1st University Eye Clinic of Vienna.

Fig. 4 (Pillat). Friedrich von Jäger.

Fig. 5 (Pillat). Ferdinand von Arlt.

At that time, Friedrich Jäger, assistant and son-in-law of Beer, was professor of ophthalmology at the Medico-Surgical Josef Academy (Josephinum) in Vienna. An excellent physician and surgeon, he had given up couching the cataract altogether, and made his method of choice the extraction with the section above.

Jäger had a clear conception regarding the contagiousness of trachoma through direct contact, and demanded isolation of persons with proven or suspected trachoma. He recommended the use of copper sulfate for the treatment of trachoma and inoculation with the purulent secretion from babies with blennorrhea neonatorum to clear a dense

Fig. 6 (Pillat). Karl Stellwag von Carion.

pannus. Among his disciples were Sichel, founder of modern French ophthalmology, and C. F. Graefe, father of Albrecht Graefe.

In Hirschberg's term, the "reform of ophthalmology," which occurred around the middle of the 19th century, stimulated, as Arlt wrote, by the "natural-historical orientation of medical studies," was introduced by Skoda and Rokitansky. With the appointment of Prof. Ferdinand Arlt from Prague in 1856, a mighty impetus was given to the growth of ophthalmology that began in Vienna with Georg Josef Beer, and was destined to culminate in the life work of Ernst Fuchs.

Arlt, the son of a poor smith in Graupen in the Ore Mountains, directed the Vienna Eye Clinic from 1856 till 1883. An assistant to F. N. Fischer in Prague, he had taken a three months' course in eye surgery with Friedrich Jäger in Vienna prior to his appointment as professor for ophthalmology in Prague. In Prague, Coccius and the young Albrecht von Graefe were already Arlt's pupils.

A life-long friendship developed between Arlt and von Graefe. Graefe wrote: "Arlt introduced me to ophthalmology; he impressed upon me the same pure principles that he himself adhered to in the practice of his specialty; he was first to show me how an operation on the eye should be performed —I believe without Arlt, I may perhaps not have returned to Berlin as an oculist."

Arlt's students and assistants in Vienna were Businelli, later professor in Rome; Rydel, later professor in Krakow; Wilhelm Schulek, later professor in Budapest; Otto Becker, later professor in Heidelberg; Herbert Sattler, later professor in Leipzig; in addition to Kerschenbaumer, v. Reuss, Bergmeister, E. Fuchs, Dimmer, Denk in Linz, Adler, Königstein, Othmar Purtscher in Vienna, and many others.

Arlt was an untiring teacher and an unsurpassed surgeon. His textbook on surgery was received with admiration by his colleagues in 1874. Sattler has said that Arlt personally conducted a practical course in surgery for local and foreign ophthalmologists for 21 years, at times more than once during a semester. There were five editions of his textbook on ophthalmology within seven years.

Ophthalmologists are indebted to him for recognizing the increase in the axis of the myopic eye as the cause of this refractive anomaly. We also are indebted to him for giving a clear conception of the posterior chamber and for the famous picture of a cross section of the eye drawn by Dr. Elfinger in a $\times 4$ magnification on his order. He was most eager to use at once the ophthalmoscope invented by the ingenious Helmholtz in 1851, but failed to participate in ophthalmoscopic research.

In 1884, Karl Stellwag von Carion succeeded Arlt. He was a pupil of Rosas and professor of ophthalmology at the Josephinum which had been closed in 1874. We are indebted to Stellwag for proving that

hypermetropia is a separate refractive anomaly, and for clearly differentiating accommodation from hypermetropia. His textbook on the practice of ophthalmology (1861-1862), according to Hirschberg, . . . "has reaped the harvest of the first ten years of reform more than any other in the world's literature."

In his treatise, "On certain innervational disturbances in Basedow's disease" (1869), Stellwag was first to describe the infrequency and incompleteness of lid winking, a symptom named after him. He directed the First Eye Clinic till 1894. From then on, he lived in retirement, dedicated to humanistic culture and poetry, to the playing of the violin, and to the studies of botany and history. He died in 1904.

In 1894, Josef Mauthner, chairman at Innsbruck, was appointed Stellwag's successor. A pupil of Eduard von Jäger, he wrote a textbook on ophthalmology which was intended as an explanatory supplement to Jäger's famous atlas of the eyeground. Ophthalmology is indebted to him for a treatise on optical aberrations of the eye with a summary dissertation on asthenopia. Mauthner's area in the brainstem is named after him. He died on the day he was called to Vienna.

At the time of Arlt and Stellwag, Eduard von Jäger, son of Friedrich Jäger and grandson of Josef Beer, had been active as professor of ophthalmology in the eye department of the Vienna Allgemeines Krankenhaus since 1858. When this eye department was changed to the Second University Eye Clinic in 1883, Eduard Jäger was made the first chief of this clinic. However, he was allowed only one year to teach; he died in 1884.

Eduard Jäger's name is associated with the ophthalmoscope for all times. His masterly use of this instrument, together with an artistic gift for drawing, made possible in 1855 (four years after the invention of the ophthalmoscope) the publication of original paintings of the human fundus, that, even today, are unsurpassed in accuracy and artistic truth. According to Hirschberg, "Eduard v. Jäger was the greatest ophthalmoscopist the world has seen, and it seems doubtful whether there will be another man who will equal him in this art."

It was Jäger's merit to teach and employ direct ophthalmoscopy which oculists had neglected for a while in favor of the indirect method. He also introduced into practice the objective estimation of the refractive state of the eye with the ophthalmoscope. Further known are his work on the facts of the dioptric apparatus (1861), referred to repeatedly in Donders' classical book, *The Anomalies of Refraction and Accommodation of the Eye* (1888), as well as near-test visual charts in use to this day. His disciples were Mauthner, Schnabel, Klein, and also, during the year of his clinical professorship, Friedrich Dimmer.

With the appointment of Ernst Fuchs (born in Vienna, June 14, 1851), who had been professor of ophthalmology in Liège since the age of 30 years, as successor to Eduard v. Jäger at the 2nd Eye Clinic, the Vienna Ophthalmological School was soon to reach the zenith of its fame and recognition and its important position throughout the world. After his graduation in 1874, Fuchs was a student in Billroth's department of surgery for two years, later becoming Arlt's assistant, and establishing himself in 1880 in the academic career. For 30 years, from 1885 until 1915, he was head of the 2nd Eye Clinic in Vienna. The older ones among us, his disciples, and all of us, disciples of his disciples, are under the spell of his towering personality. He died on November 21, 1930, two days after his return from one of his many journeys.

Fuchs was an avowed pupil of Arlt. Like his teacher, he was primarily a clinician but, more than any of his predecessors, he used his studies in the histology and anatomy of the eye as a solid foundation for his clinical observations. He far surpassed his teacher in knowledge and ability.

The importance of Ernst Fuchs in ophthalmology during the last two generations can be most clearly illustrated by comparing the textbook of his teacher, Arlt, with his own which was published in 1889 during the fourth year after he had taken over the Vienna Eye Clinic. Fuchs himself said that it contributed more to his fame than all his other scientific papers.

During the first 16 years there were 10 editions and a number of translations, among them some in Japanese and Chinese. The last edition (1910), supervised by Fuchs himself, was the 12th.

Later, the textbook was brought up to date and supplemented in the same spirit by his oldest pupil, Salzmann, who, in spite of his advanced age and impaired sight, could not be prevented from attending this gala meeting in honor of his teacher, and whom we welcome most heartily in our midst as one of the most important disciples of the great master.

Fuchs's textbook is a masterly work of a clear and comprehensive presentation of what is known in our specialty through more than 50 years. Ophthalmologists for 50 years and throughout the world have considered this classical book as the Bible in their specialty, and have derived advice, advantage, and stimulation from it. It is unique in the history of medical textbooks and, up to this day, is hardly outdated in its contents and presentation. It can well be stated that the personality of Ernst Fuchs and his textbook have contributed considerably to the fame and the importance of the Viennese Ophthalmological School throughout the world.

Into this textbook, the entire scientific life work of this great teacher, researcher, and physician is woven in such a simple and unaffected manner that succeeding generations are hardly conscious of the fundamental facts that Ernst Fuchs, in his remaining scientific accomplishments, has created in our specialty.

To many forms of diseases his name has become attached. Ophthalmology is indebted to him for the knowledge of superficial punctate keratitis, keratitis pustuliformis profunda (caused, as we know today, by acquired syphilis), of epithelial corneal dystrophy, of the facet ("Dellen") formation of the cornea, of senile marginal atrophy, and the so-called "clearing stripes" in corneal scars of long standing.

The clinical picture of blepharochalasis, myatrophic ptosis, herpes iris conjunctivae, and episcleritis periodica fugax bear his name. He was first to point out the interesting phenomenon of associated movements of the lids and their congenital shortening. Based on large clinical and histologic material collected with untiring energy, he was able to describe in detail and define the well-known clinical picture of ring abscess of the cornea, disciform keratitis, and nodular corneal dystrophy. Fuchs's heterochromia iridis and its triads have been incorporated into the textbook presentations of the entire world.

Many fundus diseases also bear his name, as the black spot in the foveal region in high myopia, circinate retinitis in the senile, and gyrate choroidal and retinal atrophy. Our knowledge of choroidal detachment, so frequently seen after cataract operations, can be traced back to him. One of the heterotropic conus formations at the nervehead, the so-called conus inferior, is everywhere known as Fuchs's congenital rudimentary coloboma of the choroid.

We owe Fuchs a more exact knowledge of the anatomy of the eye regarding the blood and lymph vessel apparatus of lids, iris, and the lamina cribrosa. His description and measurements of the insertion of the extraocular muscles can be found in textbooks and compendia throughout the world, yet one hardly stops to think today of this as the work of Ernst Fuchs.

Thanks to Fuchs, there is a clear conception of chronic endogenous uveitis, the pathologic and clinical differences between septic endophthalmitis and sympathetic ophthalmia. Fuchs discovered the diffuse forms

of sarcoma of the choroid; he wrote a large monograph about sarcomas of the uvea and the most frequent forms of necrosis of this type of tumor in the eye. He could demonstrate a peculiar form of sympathetic ophthalmia as a consequence of this disease.

Salzmann was right when he said that two separate volumes could have been created from Fuchs's textbook—one about the normal and one about the morbid anatomy of the eye. All in all, Fuchs has reaped a harvest for ophthalmology, the like of which is rare in any branch of medicine, and which is allotted only once in centuries to a few chosen ones.

His spirit continues to be with us yet in another sphere. A versatile man, imbued with a broad scientific and medical knowledge, Fuchs, together with Bamberger, was the founder of the *Wiener Klinische Wochenschrift*, the official journal of the Vienna Medical Society of which he was an esteemed honorary member.

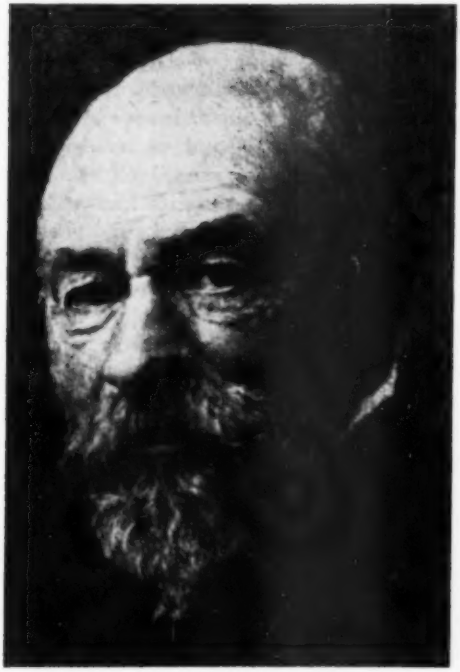

Fig. 7 (Pillat). Isidor Schnabel.

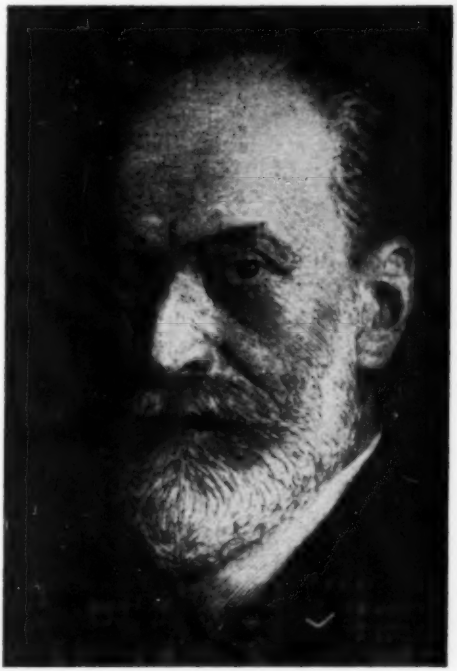

Fig. 8 (Pillat). Friedrich Dimmer.

Another medical discovery of worldwide importance occurred in Vienna during the period when v. Reuss succeeded Eduard Jäger at the 2nd Eye Clinic after the latter's death. This discovery was the introduction of cocaine as a local anesthetic in ophthalmology and other branches of medicine by Karl Koller in 1883; at that time he was assistant at the 2nd Eye Clinic. With the use of cocaine, a new epoch commenced in ophthalmic surgery.

Simultaneously with Fuchs, Isidor Schnabel, assistant and pupil of Eduard v. Jäger, was active in Vienna as head of the 1st Eye Clinic, a successor to Stellwag in 1894. Ophthalmology is indebted to him for important research on myopia and glaucoma (which he considered a disease of the optic nerve). Schnabel's lacunae in the optic nerve are named after him. He was an excellent teacher and a powerful speaker. His pupils were Anton Elschnig, later professor in

Fig. 9 (Pillat). Stefan Bernheimer.

Prague, and Hans Lauber, later professor in Warsaw.

In 1910, after Schnabel's death in 1908 and an interim of almost two years, Friedrich Dimmer, born in Prague, disciple of Arlt and assistant to Eduard Jäger and Ernst Fuchs (later becoming his brother-in-law) was called to Vienna. Formerly he had directed the eye clinic in Innsbruck and Graz. Dimmer was head of the 1st Eye Clinic till 1915 and, after the retirement of Fuchs, was head of the 2nd Eye Clinic until 1926.

The name of my teacher, Dimmer, will always be associated with the first practical and scientific method of reflex-free fundus photography. The instrument, constructed with the coöperation of the firm of Zeiss, has been donated to the Technical Museum in Munich, a perpetual proof of determined German research activity. Photography of the eyeground was, however, only the keystone to a series of important investigations on physiologic phenomena of the human retina that are also of great clinical importance. Based on careful studies, Dimmer gave an explanation for the light reflexes on the inner surface of the retina, for the reflex stripes on arteries and veins, as well as the form and size of the fovea centralis and macula lutea. He gave a comprehensive report in his monograph (1891), "The ophthalmoscopic light reflexes of the retina."

His monograph, "Contribution to the anatomy and physiology of the macula lutea in man" (1894) was a logical continuation of previous anatomic and physiologic studies. He was first to prove the presence of yellow pigment in the macula lutea of the living eye by examining the retina in pure sunlight. Gullstrand had questioned the truth of this fact.

The result of his studies in ophthalmoscopy was his book, *Ophthalmoscope and Ophthalmoscopic Diagnostics* (1887, second edition 1890). The third, completely revised edition was dedicated to Ernst Fuchs. It has become an excellent reference work for the ophthalmologist that contains everything known in ophthalmoscopic diagnostics up to 1921.

Though problems connected with ophthalmoscopy were closest to Dimmer's heart, his name, on the other hand, is lastingly associated with certain clinical pictures. He was first to describe a congenital lid anomaly (1885) that, later, was called epiblepharon. He was first, simultaneously with but independently of Haab, to describe the latticelike corneal dystrophy, and also give the first description of nummular keratitis.

His surgical interests were devoted in particular to corneal transplantation, subconjunctival cataract extraction, and squint surgery. In his research, he was calm and soberly deliberate, very objective, conscientious, and soundly self-critical.

It was because of his talent as an organizer that Austria's most beautiful eye clinic was built in Graz (1910), planned by his zealousness. He was not to enjoy his creation though, as he was called to Vienna in 1910. Here, he proved his talent as an organizer anew by remodeling Arlt's old clinic.

Stefan Bernheimer, director of the 1st Eye Clinic from 1916 until 1918, published numerous fundamental papers on the course of the fibers in the chiasm and the nuclear region of the ocular nerves. Following him, the chairs for ophthalmology in Austria were dominated by the School of Fuchs (whose influence extended throughout the world) through his three most prominent representatives—Salzmann, Meller, and Lindner. His remaining students and assistants, Sachs, Hanke, Bergmeister, Jr., A. Purtscher, and others headed the other eye departments in the country.

Ernst Fuchs's oldest assistant, Maximilian Salzmann, was called to Graz in 1910. In 1936, I took his place in that modern eye clinic in Graz.

In some way, all of Salzmann's investigations are fundamental because they are based on his exact mathematical-optical disposition. As Fuchs's assistant, he started his investigations with "Seeing in diffuse circles," "Accommodation in aphakic eyes," and "A contribution to the localization in the interior of the eye."

Like his teacher, Fuchs, he based all his clinical problems on anatomy. We are grateful for his anatomic-pathologic investigations on "The choroidal changes in excessive myopia" (1901), "The avulsion of the optic nerve" (1903), "About keratoconus" (1906), "About malformations of the human eye at the nervehead" (1893, 1927, and 1934), "The physiologic and pathologic surroundings of the optic nerve (1941), a masterful presentation. These papers, in addition to his work on glaucoma, always will be a starting point for those interested in these important special problems in ophthalmology.

There are two feats that will tie Salzmann's name for all times to the prime period of the Ophthalmological School in Vienna, namely his *Anatomy and Histology of the Human Globe, Its Development and Aging* (1912) and his studies published in *The Ophthalmoscopy of the Chamber Angle* (1913-1915).

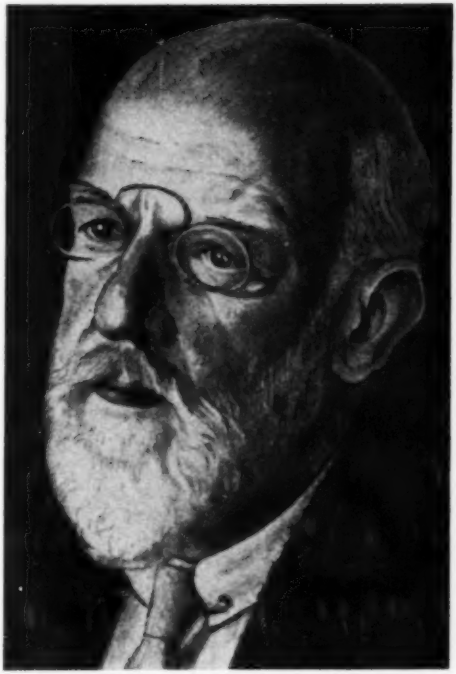

Fig. 10 (Pillat). Maximilian Salzmann.

With the first-named volume, he provided modern ophthalmology with a standard work of the normal anatomy of the eye which is important for its comprehensive and clear presentation and its accuracy, and which, in its English translation, has become the fundamental work for the anatomy of the eye in the English-speaking world.

With *Ophthalmoscopy of the Chamber Angle* (which not only contains the optical principles of this method but also, up till now, the best illustrations painted by his master hand) Salzmann became the father of gonioscopy, even though his merits are either completely forgotten or only briefly touched in a secondary paragraph in modern monographs on gonioscopy.

Ophthalmoscopy is indebted to Salzmann for some valuable surgical suggestions (such as iridectomy ab externo) and clinical presentations (ophthalmoscopy of the anemic fundus, traumatic hole formation in the macula, keratitis nummularis Dimmer, intrascleral epithelial cysts, and many others).

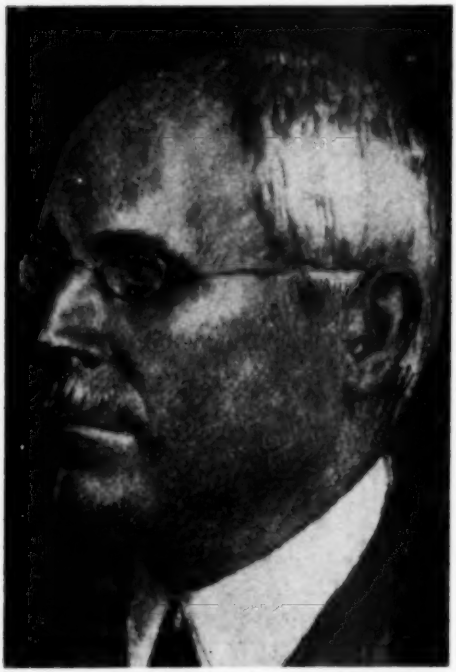

Fig. 11 (Pillat). Josef Meller.

In addition, Ernst Fuchs, as a token of high esteem for his assistant, had entrusted Salzmann with the editing of his textbook. Salzmann brought the 13th through 15th editions up to date, revised them, and provided them with fundus pictures by his own hand.

If Salzmann wrote the basic work of the anatomy of the eye, Josef Meller, living among us in perfect mental and physical health, but who, unfortunately, is out of town today, created the standard work for ophthalmic surgery. Begun in the spirit of the School of Fuchs, it was expanded or, rather, newly created by Meller, this splendid surgeon.

The sixth German edition of Meller's *Ophthalmic Surgery* (first edition in 1918) recently was revised by his student Böck, professor for ophthalmology in Graz. Its advantage is the sovereign limitation to those operations and procedures which Meller had found valuable, and which he himself used routinely. This book simply is a masterwork of presentation; its style proves that a scientific book can be written in excellent German and yet be understood by everybody. For more than 30 years, it has been the faithful companion of every oculist throughout the world. The first German edition was preceded by two editions of the *Ophthalmic Surgery* in English.

Meller's special domains were tuberculosis of the eye; a clinical, anatomic, and etiologic clarification of chronic endogenous uveitis; heterochromia iridis; and sympathetic ophthalmia. Like his teacher, Fuchs, Meller was a clinician of keen observation who based all his assertions on anatomic investigations. He enriched modern ophthalmology with the histologic facts of important glaucoma operations; he introduced the clinical and histologic entity of internal ulcer of the cornea, corneal sclerosis, and posttraumatic scar formation of the retina and choroid.

There are fundamental investigations on spontaneous and postoperative detachment of the choroid, on the nature of v. Hippel's disease, and on the resorptive activity of the epithelium of the ciliary body. He gave a most complete description of the clinical and pathologic picture of keratitis punctata leprosa, of posttraumatic ring-shaped edema of the cornea, and of keratitis pustuliformis profunda.

Meller was first to call attention to the participation of the ciliary nerves and vessels in herpes zoster ophthalmicus, and many other conditions. Like his teacher, Fuchs, Meller has contributed to the world-wide importance of the Vienna Ophthalmological School through his scientific life work, his surgical skill, his inspiring lectures, and his personality.

As successor of Dimmer, D. K. Lindner, the youngest assistant of Ernst Fuchs, who, later, had been assistant to Dimmer for a short period of time, continued the tradition of his teacher, Fuchs, in his clinic. His scientific personality is known to all present.

Through the unveiling of his marble relief, the University of Vienna accepted Ernst

Fuchs into the group of its great scientists on the occasion of the 100th anniversary of his birth. The Medical Society of Vienna together with the Ophthalmological Society celebrate their famous honorary member in this meeting, all these organizations thus honor our country and its great ophthalmological school.

A scientific school does not spring from the material wealth of a country but from its wealth in personalities, in honest, zealous researchers, in men of highest idealism, in inspiring teachers with the highest sense of duty, and, in the case of a medical school, in kind and great physicians.

Among the men who, since 1812, have represented the Vienna Ophthalmological School there is none who tried to create fame for himself in this world by means of a scientific smoke screen. There is no titan trying to crash the gates of Heaven. All were quiet, unassuming, and enthusiastic brain workers. None of them sought superficial fame. Recognition came to them naturally. None of them planned to be the founder of a famous school. The school grew from its own strength.

At first, there was Georg Josef Beer—a self-made man of unexcelled will power and consistency; later, there was the venerable, I might almost say patriarchal, personality of Ferdinand Arlt with his gift to observe and to pass his observations on to his disciples and to enthuse and inspire them.

On the threshold of our time, there is Ernst Fuchs, almost unaccessible, and, as Salzmann said, "every inch a chief." Fuchs considered his time too valuable to devote it to anything but his scientific activities and his inner urge to work.

Because of these men, their disciples and the disciples of their disciples, the Vienna Ophthalmological School of exact clinical observation and histologic research grew in this city, ready to accept and test everything new, but to perpetuate for the benefit of the sick only that which was true and permanent.

1st University Eye Clinic.

THE POSTOPERATIVE CARE OF RETINAL DETACHMENT*

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Herein is a brief report of clinical experiments in the ambulatory postoperative care of retinal detachment cases.

Since Gonin described his method of operation for retinal detachment, the postoperative care of these cases has been most extraordinary. Let's look at some of the reasons for this:

1. Gonin did it and was highly successful. My suggestion is that his surgery was good but we need not do precisely what he did postoperatively just because *he* did it.

2. Everyone since Gonin has done it. My reply is that men make the same mistake again and again for many years and call *that* experience.

3. The conservative surgeons say that immobility favors wound healing and makes recovery more likely. This point warrants a bit of discussion.

In the first place the eye cannot be immobilized under any conditions. I believe that healing, if it is to occur at all, will occur quickly in any clean wound in soft tissues.

Little is known of intraocular dynamics. However, ocular muscle structure and motion are so beautifully designed and balanced that it seems reasonable to assume that no tensions are produced within the eye by any ordinary and comfortable rotation. Furthermore, the thought of prolonged immobility often makes the patient so dread retinal detachment surgery that he will refuse operation.

* Presented before the Greenville County Medical Society, March, 1952.

TABLE 1

DATA ON NINE CASES OF RETINAL DETACHMENT

Case	Age (years)	Hole	Duration	Complications	Area Involved	Preop. Vision	Postop. Vision	Preop. Field	Postop. Field	Reattachment
1	61	Yes	5 days	Nausea and vomiting on fourth day	Upper nasal	20/50	20/20	Restricted below and temporally to 15°	Full	Yes 4 yr.
2	61	Yes	2 days	Aphakia, Glaucoma, Optic atrophy	Upper half down to disc & macula	No central vis.	20/40+	Cannot obtain	Gun barrel in lower half to 5°	Yes 3 yr.
3	81	No	Weeks?	Aphakia, Vitreous opacities	Lower half could not be seen	H.M. in lower field	H.M. in lower field	Small lower field	Small lower field	No
4	54	Yes	3 wk.?	None	Temporal half	20/200	20/200	Nasal half	Full	Yes 16 mo.
5	48	Yes	2 wk.?	Aphakia, Severe diabetes	Upper temporal & nasal	H.M.	L.P.	Small upper temporal field	None	No
6	69	Not seen	1 wk.	Aphakia	Upper temporal involving macula	Less than 20/200	20/25	Not recorded	Full	Yes 12 mo.
7	52	Yes	10 days?	None	Complete detachment	H.M. temporal	H.M.	Small temporal field	Not recorded	No
8	50	Yes	Unknown	Old injury cataract and iris atrophy	Upper temporal half	20/200	L.P.	Upper temporal	Upper temporal	No
9	69	Yes	2 wk.?	None	Temporal half	Less than 20/200	20/40	Not recorded	Small dent in nasal field	Yes 5 mo.+

4. Those favoring prolonged restriction of motion cite cases in which, even after six weeks, detachment recurs as the patient leaves the hospital. My contention is that in such cases the operation itself was a failure and detachment would have recurred after any amount of attempted immobility. Many isolated cases have been cured without any extraordinary care or following the most amazing and immediate postoperative accidents and complications.

5. Peephole glasses will, they say, cut down eye motion and favor healing. This cannot be proved and there is reason to believe that the effort required to look through the holes may be worse than free range of normal motion. Many patients have received severe blows while trying to move about when they were wearing peephole glasses.

Sometime ago I had to operate a retinal detachment in an aphakic eye in a cardiac patient who could not lie down. He was operated and immediately allowed up in a chair. There were no toilet restrictions. I knew of no precedent for such a procedure. A complete reattachment occurred.

Since this experience, other postoperative retinal detachment cases have been handled with reasonable care. A moderate effort is made to keep the patient quiet for five days. The eyes are observed on the third day. Dressings are dispensed with after five days. The patients are allowed home in 10 days, or even less in the absence of complications.

Case reports

In nine cases, the postoperative treatment has been as described. Of these cases, five (56 percent) have been successful. All cases, good and bad, in which I did the surgery are included, and the results are about average as detachments go.

Case 1

F. R., a woman, aged 61 years, had a detachment in the upper half of the left eye and a rather large irregular hole in the upper temporal quadrant. The detachment came down almost to the disc but did not hide the disc or the macular area.

She was operated using the Walker cautery and Kronfeld needles. Fluid was allowed to escape through a small knife incision and the retina was observed in place except in the extreme upper nasal quadrant.

On the third day there was nausea and vomiting. On the fifth day the field was full to hand movements and there was no apparent detachment and no scarring was seen. She had been allowed to turn on one side the day following surgery; peephole glasses were given on the ninth day. Sitting up in a chair was allowed on the 10th day and walking on the 13th. She went home by car on the 21st day. This patient, a nervous individual, was at no time required to be perfectly quiet.

Four years after operation, the field in the operated eye is full; vision is 20/20 and J1. There are no signs of scarring and no apparent abnormality of the fundus of the left eye.

Case 2

S. O. Q., an elderly man, had a cardiac failure which would not permit him to lie down for any length of time. The aphakic glaucomatous eye was seen within two days of the onset of symptoms of detachment in the upper nasal quadrant. The tear was well visualized.

The sclera was cauterized, fluid was withdrawn, and the retina was observed to be in place. Subretinal fluid and air were injected into the vitreous through the cornea and pupil, restoring firm tension to the globe.

The patient was returned to his room in a wheel chair with eyes bandaged and was allowed to remain up when and as he chose, bathroom privileges being allowed at all times.

The fundus was observed on the fifth day and the retina was found to be in place. He was given peephole glasses on the sixth day and allowed to go home on the 10th day. A cure resulted, with retention of his former field and virtually normal central vision at the time of this report, now more than two years later.

Case 3

C. S., a woman, aged 81 years, was believed to have a retinal detachment three months after cataract extraction. The detachment was thought to be in the lower half, though it was never seen. Operation, with removal of fluid, was done after several weeks. There is some doubt, due to vitreous opacities, that this case was one of a detachment and it is more than likely that the patient should never have been operated on.

Case 4

B. T. B., a woman, aged 53 years, had a detachment in the upper temporal quadrant and was operated on four to six weeks after onset of symptoms.

The tear was easily found. Simple cauterization and withdrawal of fluid were first done. The patient was put to bed, but no attempt was made to immobilize her. The eye was observed on the third day, and there was a small detachment lateral to the macula. This progressed rapidly and the eye was reoperated on on the eighth day, this time with the

injection of subretinal fluid and air into the vitreous. The eye remained soft, and a pressure bandage was applied.

On the third day after the second operation, the patient, who was restless, was allowed up in a chair and peephole glasses were used. Because of vitreous haze, the retina could not be well visualized. On the 12th day, the retina being in place, the patient was allowed to return home. Three weeks later a subretinal hemorrhage developed in the macular area. Six months later the retina was in place and the field and tension were normal, but the central vision was only 20/200, not as good as before operation.

CASE 5

A. G., a woman, aged 48 years, a severe diabetic, had a cataract removed on September 3, 1948. On February 19, 1951, there was a detachment in the upper temporal quadrant with a large horseshoe tear.

On February 21, 1951, operation was done. On February 27th, the retina was seen to be detached temporally in two small areas. Four days later, the areas had enlarged and she was reoperated on March 3, 1951. So far as could be seen, the presence of air in the vitreous prevented a satisfactory view, the retina was in place on March 10th and she was allowed to go home. Her vision was only hand movements and the field poor.

On April 6th, a detachment was present in the upper nasal quadrant and was operated on that day. The eye stood all these procedures with very little reaction, but reattachment was not obtained and at this time she has only light perception and a complete detachment with vitreous bands. The retina is in shreds.

CASE 6

A. W., a woman, aged 69 years, had a detachment in an aphakic eye in the upper temporal quadrant and was operated on one week after the earliest symptoms of detachment were observed. The tear was not found.

Cauterization was done and one cc. of air was injected through the pupil. On the fourth day the retina was found in place and the patient was allowed up. On the eighth day, when she went home, the retina was in place and the eyes were bandaged.

Two weeks later a small detachment far forward in the temporal area was observed. This progressed rapidly, and three days later a second operation was performed, with transpupillary replacement of subretinal fluid and injection of air.

On the third postoperative day the retina was in place and the patient was allowed up in a chair. As tension was low, air was again injected through the pupil to make the eye firm to palpation. She was allowed to go home on the fifth postoperative day with eyes bandgaged. At the time of writing, six months later, the retina is still in place, the field full, and the vision normal.

CASE 7

J. D. W., a man, aged 52 years, had a complete detachment. The disc could not be seen. A large rent was seen nasally below the equator. The most pronounced bulge seemed to be temporally and he had a very tiny small temporal field. He was operated in this area and on the nasal side also. Fluid was obtained from the nasal but not from the temporal side.

The patient was sent by ambulance to a hospital in a neighboring city and six days later, the retina seemed to be in place except for small flat detachments in the operative areas. The macula could be seen and he could count fingers. His field was generally constricted.

After another week, the nasal portion of the retina appeared in place; however, the temporal side did not. A few days later there was complete redetachment. Further surgery was advised but refused.

CASE 8

W. E. C., a man, aged 50 years, had a detachment of the left upper temporal area involving nearly one half of the retina down to the macula. There was a large tear in the upper temporal quadrant, well posterior and just lateral to the belly of the superior rectus.

There was iris atrophy, an old partial traumatic cataract, and history of injury with a rock at the age of nine years. The duration of the detachment is unknown.

The patient was operated March 14, 1951. He had severe nausea and vomiting the following day. On March 16th, the retina appeared in place. On March 21st, it still seemed in place, although the patient had gradually been allowed to get up.

On March 22nd, there was partial detachment in the original area; the hole was not sealed off. He was reoperated on March 27th at which time it was noted that this seemed to be an old case with vitreous adhesions.

Two large holes were seen above on April 2nd and a third operation was advised but refused.

CASE 9

W. W. C., a woman, aged 69 years, had a detachment of the temporal half extending nearly to the macula. A hole was observed, horseshoe in shape, in the far periphery in the upper temporal area. She was an extremely nervous person and could not be quiet. She was operated October 16, 1951.

Two days later the retina was in place and peepholes were given. On the fifth day she was allowed bathroom privileges. On the ninth day she was allowed to make the 65-mile drive home in a car. She returned in one week and the retina was in place. There was a small defect in the nasal field and vision was 20/50+.

At this time she was allowed to remove the peephole spectacles for meals. One week later, they were omitted entirely. Five months after surgery vision was 20/40, the field was excellent, and the retina was in place.

AN ANATOMIC STUDY OF THE PERIPHERAL RETINA*

II. Peripheral cystoid degeneration of the retina; formation of cysts and holes

C. C. Teng, M.D., and H. M. Katzin, M.D.
New York

Introduction

Many authors have stressed the point that cystoid degeneration of the peripheral retina may lead to hole formation and retinal detachment. As Duke-Elder[1] said: "The great clinical interest of cystoid degeneration is the potential part which it plays in retinal detachment."

To our knowledge no exhaustive survey of this subject has been made on anatomic material. We have had the opportunity to examine so-called normal eyes obtained for The Eye Bank at post mortem. These eyes constitute a rich library for studies of this sort. We found in the periphery of the retina many interesting features concerning cystoid degeneration which we believe worthwhile to report.

Methods and Materials

Eyes were fixed after removing the cornea for transplant purposes, and the calottes were examined in a transparent chamber by means of a slitlamp (refer to Part I[2]). Lesions were first recorded by description and drawings. Then they were marked for serial histologic sections.

Morphology

In fresh eyes, due to the transparency of both retina and cystoid areas, abnormalities are difficult to see. After being treated with fixative, however, the retina becomes opaque and the degenerated areas remain transparent. By contrast, the patches of degeneration become clearly visible. These patches are found along the periphery of the retina and also on the teeth of the ora.

In mild cases, usually in younger eyes, they take the form of a few isolated oval spores, or through confluence of adjoining cavities become lobulated. Further development leads to dendritically branched clear spaces, often with incomplete separations.

In advanced cases, usually in older persons, they form a more extensive patch extending posteriorly, forming an irregular degenerated band or zone. This band may be complete or interrupted by irregular wedges of normal retina.

Cystoid changes, in general, vary in intensity on the two sides of the eye. On the nasal side in mild cases, cystoid degeneration is usually found close to the margin of the ora along the slopes of the teeth, resembling the tension cords of a parachute. In more extensive instances they form a large patch at the base of each tooth.

On the temporal side the pattern is different because the teeth are much less prominent. In the mild form, the degenerated area usually is arranged as an irregular, continuous narrow band. A wide band is seen in severe cases.

The areas of cystoid change may be very irregular and interrupted, or form single isolated patches. Such a single isolated patch may be as large as 12 by 8.0 mm. and extend posteriorly to the equator of the eyeball. A large, isolated patch of this sort may progress to the development of a retinal cyst.

The spores or branched-formed areas of degeneration have a tendency to arrange themselves in a meridional direction except in the case of the teeth of the ora. As cystoid degeneration progresses, the involved

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areas close to the ora become larger while newer, smaller ones develop posteriorly.

Influence of age on degree of degeneration

The factor of age has a very marked effect on the degree and extent of cystoid degeneration. The condition is very rare in infancy and universal in old age.

From the recent literature, Occhi,[3] Lauber and Kollmer,[4] and especially Klemens[5] have reported that peripheral cystoid degeneration of the retina does occur in babies even as early as the age of six days.

In our collection of 13 premature babies' eyes, we did not see any peripheral cystoid degeneration. A five and one-half month-old infant presents the youngest case that we have seen in which there was definite cystoid degeneration.

Babies' eyes are difficult to examine grossly with the slitlamp, in most cases, due to the presence of Lange's fold. If there is no fold at the ora, there is often an irregular line of rarefaction which is very similar in appearance to cystoid degeneration.

This results from the fact that at the region of the ora the various layers of the retina are usually very irregularly arranged. If the plexiform layer is more prominent and the granular layer less so, the resulting appearance resembles cystoid change. The two conditions can be differentiated because of the scattered spore appearance of early cystoid degeneration.

Our study to date includes 170 eyes. Table 1 gives graphic illustration of the age factor.

In general, before the age of 30 years, degeneration is very mild. From the age of 30 to 40 years, degeneration is not marked; there is only one exception to this rule among our 13 cases in this age group. From the age of 50 years on, the degree of degeneration in most instances is marked. The 10-year span between the age of 40 to 50 years is important because in many cases at this period there is the establishment of adhesions between vitreous and retina at and posterior to the region of the ora serrata.

Regional distribution

It has been observed that, in most eyes, the temporal side is more extensively degenerated than the nasal side. For this study, 87 eyes showed the temporal side more extensively involved, while in 15 the nasal side was more involved. Thirty-two cases showed both sides with an equal amount of degeneration. In 33 eyes, the upper sector was more extensively degenerated; in 29 cases, the lower sector was more degenerated; and in 69 cases, the same amount of degeneration

TABLE 1

Influence of age on the degree of cystoid degeneration

Age (years)	Negative	+	++	+++	++++	Unable to examine	Total
Premature	13	0	0	0	0	0	13
Up to 10		1					1
10–20		0					0
20–30		2					2
30–40		8	3	1	1		13
40–50		9	11	3	6	1	30
50–60		8	13	9	11	4	45
60–70		4	17	3	13	3	40
70–80		2	5	4	6	3	20
80–90			1		3		4
90–100				1	1		2
Totals:	13	34	50	21	41	11	170

Key: + A few spores to 1-mm. wide band
++ 1-mm. band to 2-mm. band
+++ 2-mm. band to 3-mm. band
++++ 3-mm. band to 12-mm. band

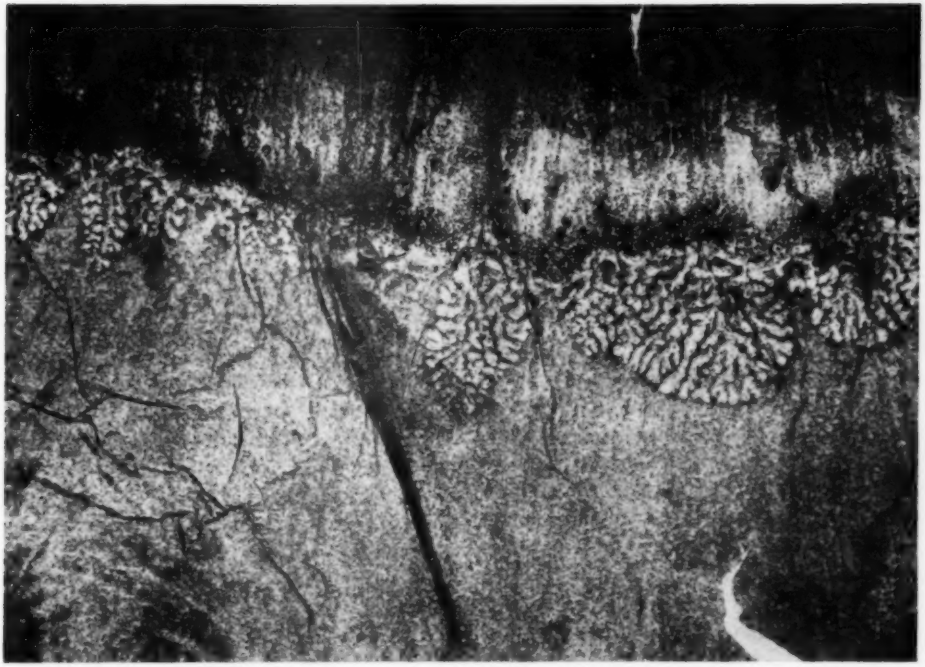

Fig. 1 (Teng and Katzin). Flat preparation of the retina. Periodic acid stain. Nasal side. Choroid in position. There is moderate peripheral cystoid degeneration. Note the pattern of cystoid patches with reference to the teeth of the ora.

in both upper and lower segments was observed.

Formation of retinal cysts

Of the 170 eyes used in this study, 10 of them had unusually large cysts. These varied in size from 0.3 by 0.3 to 8.0 by 4.0 mm. Three types were identified from these large cysts.

The first type (figs. 7 and 8) appeared to develop from dilatation of single cystoid spaces. They usually had a fairly well-defined margin. The inner wall was always very thin, and protruded into the vitreous like a bladder. Its contents were fairly clear. Examination under the slitlamp revealed it as an oval empty space. There were no blood vessels in the inner wall, which was adherent to the hyaloid membrane of the vitreous.

The second type (figs. 5, 9, and 10) developed from the breaking down of the pillars of supporting tissue between cystoid spaces, splitting the retina, resulting in the formation of a large, confluent cyst. The remnants of the old partitions can be made out on the inner surfaces of the cyst.

The inner wall is of irregular thickness but usually it is thicker than in the bladder type of cyst described above. Blood vessels of various size are often seen in the inner wall.

This is the type of cyst that will cause hemorrhage if the wall is ruptured. This type of cyst is often found on a large isolated patch of cystoid degeneration. Instead of forming very large cysts it may resemble a flat detachment.

The third type develops from combinations of the above two.

Among our cases, six cysts occurred in eyes of males and four in females. Three of them were found on the nasal side and

TABLE 2

ANALYSIS OF CASES WITH CYSTS FROM PERIPHERAL CYSTOID DEGENERATION

Case	Age	Sex	Location	Types	No.	Size
1. R. E.	80	F	Upper nasal	Single dilated	1	2.0 by 1.5 mm.
2. R. E.	83	M	Lower temporal	Confluent	3	0.6 by 0.6 mm. 1.2 by 1.0 mm.
3. R. E.	69	F	Center nasal	Single dilated	1	1.0 by 0.7 mm.
4. L. E.	40	F	Lower nasal	Confluent	1	Not measured
5. L. E.	50	M	Temporal	Confluent	1	1.5 by 1.0 mm.
6. L. E.	82	M	Lower temporal	Confluent	1	5.0 by 4.0 mm.
7. L. E.	57	M	Lower temporal	Single dilated	1	2.6 by 1.5 mm.
8. L. E.	70	F	Temporal	Single dilated	1	1.5 by 1.5 mm.
9. L. E.	40+	M	Temporal	Single dilated	1	4 by 3 by 4 mm.
10. L. E.	45	M	Lower	Confluent	1	7 by 5 by 1 mm.

seven on the temporal side. Of the seven temporal cysts, five occurred in the lower half. From this limited series it would seem that the lower temporal region is the most likely place to find this type of retinal cyst. Seven were in the left eye and three in the right. Only one of our specimens contained multiple cysts.

Table 2 gives an analysis of cases with cysts due to peripheral cystoid degeneration.

TRUE HOLE FORMATION

Retinal holes resulting from cystoid degeneration were observed in three cases. In the first case, perforation had occurred through both walls of a cystoid space. In the other two cases only the external wall of a large cyst was perforated.

CASE 1

A man, aged 54 years, died of coronary

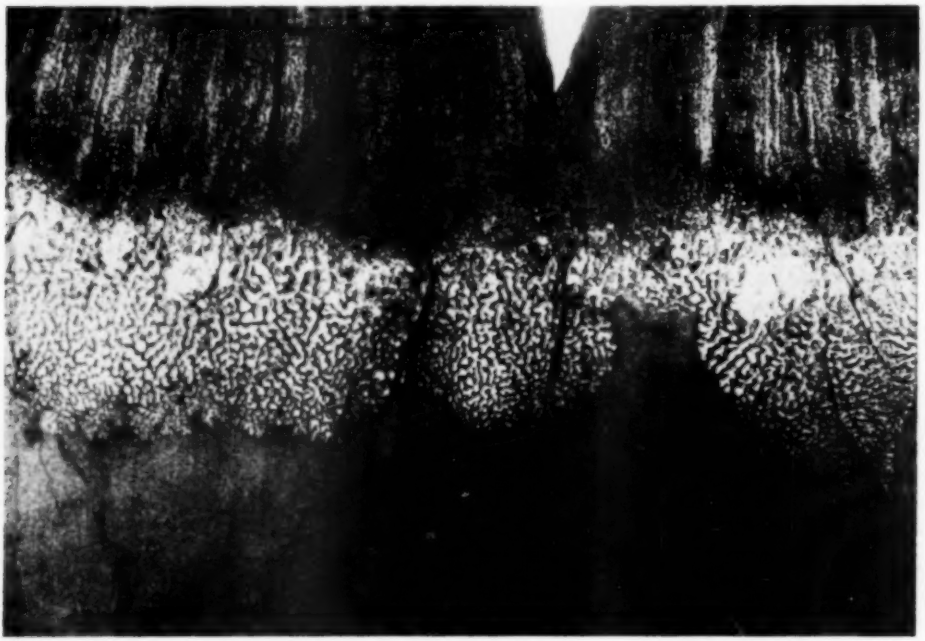

Fig. 2 (Teng and Katzin). Flat preparation of the retina. Periodic acid stain. Temporal side. Choroid in position. There is rather extensive cystoid degeneration.

occlusion and generalized arteriosclerosis. On the nasal side of the right eye there was moderate peripheral cystoid degeneration. In the center of a patch of cystoid degeneration there was an oval hole about 0.2 mm. in diameter, slightly larger than the surrounding cystoid spaces. It was formed by rupture of both the inner and outer walls of the cystoid space.

Microscopic study. As Figure 6 shows, the cystoid degeneration was of the usual character. Near the center there was a perforated hole, the edges of which were surrounded by glial tissue.

CASE 2

A man, aged 45 years, had an enucleation because of carcinoma of the lid and brow.

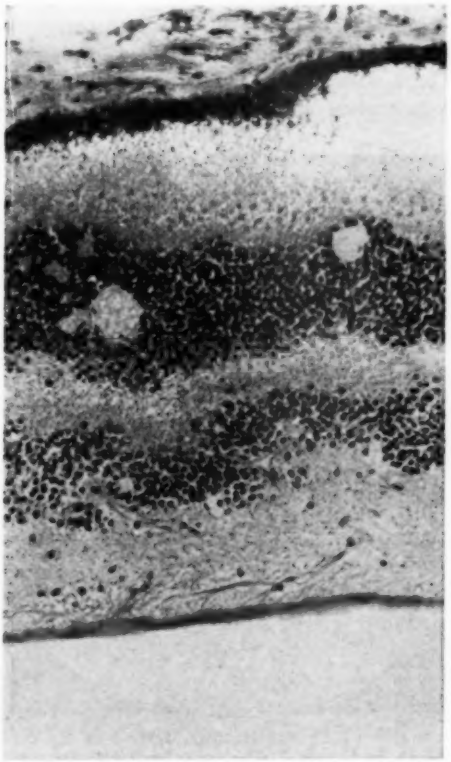

Fig. 3 (Teng and Katzin). Section of the retina. Hematoxylin-eosin stain. This shows early cystoid changes.

Fig. 4 (Teng and Katzin). Very extensive cystoid degeneration.

Fig. 5 (Teng and Katzin). Confluent cyst. Retina is separated from choroid by artefact.

There was a moderate amount of peripheral cystoid degeneration in the eye. In the lower temporal periphery there was a large isolated patch of peripheral cystoid degeneration, at the lower half of which was a large confluent cyst (fig. 9), about 7.0 by 5.0 by 1.0 mm. in size.

The inner wall of the cyst was thin but the retinal vessels were visible throughout this layer without any apparent change. The external wall of the cyst was much thicker and on the anterior portion of the external wall

was an oval hole about 2.0 by 1.7 mm. The hole had a very well-defined and rounded edge.

Histologically (fig. 10) the large cyst was evolved from cystoid spaces in a sector of the retina with extensive cystoid degeneration. Its inner wall was a thin, fibrous membrane composed of one or two layers of the nuclei of Müller fibers. The larger blood vessels and capillaries were present and were in good condition.

The posterior edge of the outer wall was much thicker, especially around the hole, and retained much normal retinal structure. The rod and cone layers still could be made out while all the other layers were disorganized and changed to glial tissue. The anterior edge of the hole, although it was just as thick, was almost entirely replaced by glial tissues. The choroid behind this region showed no pathologic change.

Fig. 6 (Teng and Katzin). Simple perforating hole in the retina through an area of cystoid change.

Fig. 7 (Teng and Katzin). A dilated cyst with a hole in its external wall. A disinserted tooth of the ora serrata can be seen anteriorly.

CASE 3

A man, aged 40 years, died of coronary arteriosclerosis with cirrhosis of the liver. There was a mild scattered type of cystoid degeneration all over the periphery of the

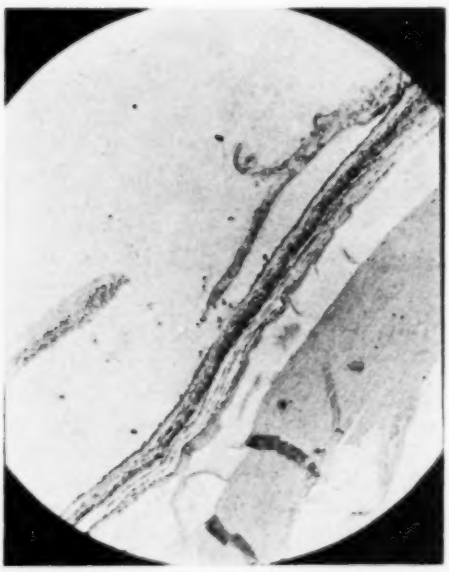

Fig. 8 (Teng and Katzin). Section of the cyst shown in Figure 7. The inner wall was ruptured purposely to demonstrate its adhesion to the vitreous. The posterior lip of the hole separated from the choroid during sectioning.

retina. On the temporal side a bladderlike cyst (fig. 7) could be seen protruding into the vitreous, 4.0 by 3.0 by 5.0 mm. in size.

The inner wall was very thin, transparent, and intimately adherent to the vitreous. The external wall was thick and opaque due to the fixative. At the anterior extremity of the external wall there was an oval hole one mm. in diameter with well-defined margins. There was no detachment.

The inner wall of the cyst was purposely ruptured by pulling upon the vitreous, and it was found that there was a strong adhesion between the inner wall of the cyst and the vitreous.

Histologically (fig. 8) there was a perforated hole similar to the previous case. The outer wall was quite similar to that in Case 2. The inner wall was composed of a structureless membrane which merged into glial tissue at either extremity.

The edges of the hole were thickened due to gliosis which made it assume an oval shape.

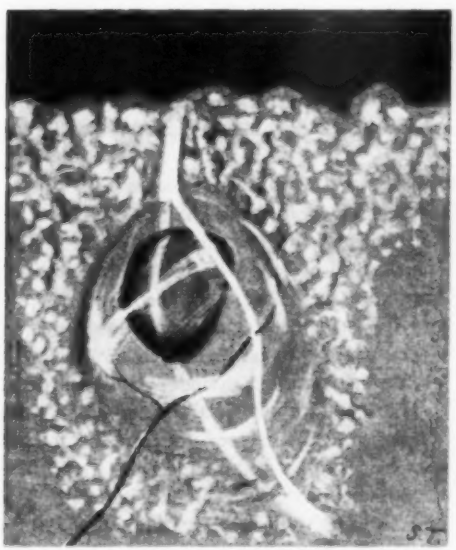

Fig. 9 (Teng and Katzin). Confluent cyst from a large patch of isolated cystoid degeneration. Optical section with slitlamp shows a blood vessel in the inner wall and a hole on the external wall.

Apparent holes or pseudoholes

During our study, we have also observed in one instance a kind of pseudohole. This was seen in the external wall of a cyst that was obviously formed by confluence. We feel that it is worthwhile to present this case in detail.

The cyst was found (fig. 11) on a large patch of peripheral cystoid degeneration. Its inner wall was slightly mottled but without perforation. There were fine blood vessels on the posterior portion of the inner wall. On the external wall of the cyst there were five areas which resembled holes.

Histologically (fig. 12) there were no actual perforations of the external wall. The inner wall consisted of a thin membrane with a few glial cells. The outer wall was found to be thicker and to contain both molecular

Fig. 10 (Teng and Katzin). Section of the same cyst as shown in Figure 9. The inner wall was ruptured and the outer wall separated from the choroid during sectioning. Note the blood vessels in the inner wall and the thickened edges of the hole in the outer wall.

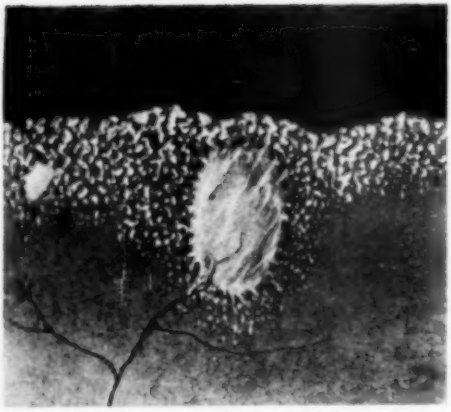

Fig. 11 (Teng and Katzin). Several pseudoholes in the external wall of the larger cyst.

Fig. 12 (Teng and Katzin). Section of cyst shown in Figure 11. Two areas are shown in which the outer wall is quite as thin as the inner wall.

layers. However, in a number of areas this wall had also degenerated into a thin, structureless membrane.

Clinical examination of such an eye would be strongly suggestive of the presence of holes.

Mechanism of production of peripheral cystoid degeneration

Since peripheral cystoid degeneration of the retina does occur in everybody after a certain age without any other pathologic changes necessary to precipitate its development, its etiology would suggest a physiologic mechanism (Blessing[6]) (Salzmann[7]).

The etiologic factors for cystoid degeneration that have been advanced in the past are:

1. Age
2. Disturbance of circulation
3. Shrinkage of cells (Kuhnt)
4. Motility and lymph stasis

Age is definitely an important factor in this condition. It is not found in the newborn but may occur in a baby as young as five months of age.

Poor circulation as the cause was suggested by Greef[8] for aged people with weak cardiac function. It is very hard to explain then, the younger group of people having this condition.

Iwanoff[9] attributed the development of degeneration to edema of the retina through damage to the capillaries. Bruno[10] also thought it might be due to a change in permeability of the endothelium of the capillary wall. But neither author could demonstrate definite pathologic changes in the blood vessels.

By studies with Hotchkiss stain,[11] we did not see any pathologic change in the capillaries over the degenerated area of the retina (fig. 13). However, with regard to the blood circulation in the region of the ora, the capillary loops in this region are reduced to one layer, and the loops are much more widely spaced than in the remainder of the retina.

The blood supply of the periphery of the retina is comparatively poor so the tissues may be more easily affected.

Shrinkage of cells. Kuhnt,[12] Landberg,[13] and Oguchi[14] thought cystoid change was due to shrinkage of cells. Occhi[3] has given special attention to the question and found that there was no evidence pointing to the various processes which lead to the shrinkage of cells.

The theory of motility and lymph stasis was introduced by Occhi.[3]

From our study we are very much in favor of the theory that the motility of accommodation is the important and causative factor in cystoid degeneration.

Anatomically, one end of the meridional fibers of the ciliary muscle is located and originates behind the region of the ora serrata. Also, the orbiculoposterior capsular fibers of the zonula originate from the ora.

During accommodation, the retina is pulled forward with the choroid by the meridional fibers of the ciliary muscle. At the same time, the orbiculoposterior fibers of the zonula are relaxed, releasing the ora serrata from tension. So, at this region of the retina, two opposing forces are created during accommodation.

Recently Schepens and Bahn[15] noticed motility of the ora serrata as well as the underlying choroid during accommodation.

In order to strengthen the peripheral parts of the retina and cushion the opposing forces, a spongy structure would be very desirable physiologically.

Occhi found cystoid degeneration in the eyes of three-year old children and we found it in a baby, aged five months and one-half months. As we know, accommodation begins around the age of six months.

Another observation favors the accommodation theory. We have noticed that the arrangement of the spores and cavities of cystoid degeneration, especially those near the teeth of the ora, are all in the direction of tension of the zonula fibers. In the teeth of the ora they lie along the slopes and in the retina. They are arranged usually in the meridional or anterior-posterior direction.

We have found, in material to be published elswhere, that adhesions of the vitreous to the retina in the region of the ora serrata do not usually develop until about the age of 40 years. These adhesions anchor the retina to the vitreous, aggravating the opposing forces created by accommodation and transmitting the tension further posteriorly in the retina. This causes the nervous elements to degenerate and Müller's fibers to increase in prominence.

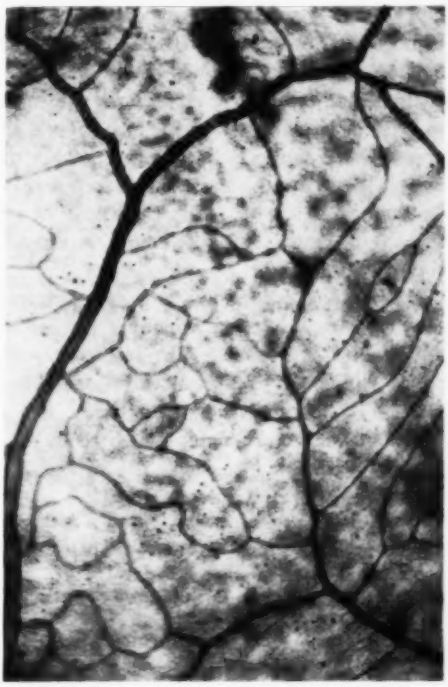

Fig. 13 (Teng and Katzin). Periodic acid stain in an area of marked cystoid change. All the light, mottled areas are cystoid. Note the normal appearance of the blood vessels and capillaries.

Cyst formation

It is well known that the causes of retinal detachment are multiple and that a cyst of the retina may be one of them. Elwyn[16] thinks that the cysts in the cases reported by Weve, Kurz, and Jancke were developed from dilated cystoid spaces.

From our study we believe that cysts of various sizes may form from the small cavities of peripheral cystoid degeneration of the retina by distention or confluence or both.

Concerning the mechanism of development of cysts from cystoid degeneration of the retina, little is known. There are four possibilities:

First, the local changes in the osmotic properties of the fluid in the cavities, or changes in the permeability of the mem-

brane, may cause the development of cysts. Fluid may be drawn from surrounding media, causing a gradual distention. (The character of cyst fluid has not been studied.)

Second, since cysts are apt to be found in areas where single isolated large patches of cystoid degeneration exist, local forces may be such as to create an unusual amount of tension on that part of the retina during accommodation.

Third, since cystoid spaces may communicate with each other in a manner similar to the cavities in a sponge, the irregular supporting pillars may act as valves, allowing fluid to pass only in one direction.

Fourth, traction effects of vitreous adhesions may split the retina in an area of cystoid degeneration.

Formation of holes

The external wall of these cysts, although it is thicker, is composed of nerve elements which have little intrinsic strength. The internal wall is stronger and is in contact with the cushioning effect of the vitreous. Hole formation may be purely degenerative or may result from tensions of the nature we have already described, either associated with accommodation, or from violent movements of the eyeball.

As we have emphasized in a previous communication, it is often very difficult to determine even with the slitlamp whether a hole is perforating or not, and whether a cyst is intact or ruptured.

Clinical examination may be even less satisfactory. As Juler[17] said in describing his clinical cases: "It was uncertain whether this edge was that of a retinal dialysis or of a vitreous membrane or of a drifting interlimiting membrane."

Injection of fluorescein has been suggested by Offret and Decaudin;[18] this may be helpful in diagnosis. Bartels[19] reported two cases of retinal detachment, both with splitting of the retina and with dialysis at the ora serrata of the inner layer which was not torn, but contained several holes.

Wilczek[20] described one case of splitting of the retina in which both layers had tears. In Roggenkamper's[21] case, only the outer layer had a tear while the inner layer was intact.

Large cysts of the retina have been reported by Ridley,[22] Schaub,[23] Stallard,[24] Weve,[25] Kurz,[26] and Jancke.[27] One of Weve's cases was examined histologically.

Rupture of cysts as the cause of retinal detachment has been reported by Deeshapland,[28] and as the cause of dialysis of the retina by Duke-Elder,[29] Rubino,[30] and Lefferstra.[31]

In studying the cases reported in the past, we note that it was impossible to be certain in every case of the sequence of events. We shall therefore attempt to present our point of view based on our anatomic findings.

Cystoid degeneration of the peripheral retina is a physiologic phenomenon. Accommodation gradually affects this poorly vascularized region of the retina. Motility causes degeneration of the nerve elements and increases the prominence of Müller's fibers of the retina to form an elastic, foamlike structure that stabilizes the retina and neutralizes the undesirable motions. Beyond the age of 40 years, the building up of adhesions between vitreous and retina spreads the motion of accommodation backward and results in more extensive development of cystoid degeneration.

The pathologic alterations associated with peripheral cystoid degeneration are cyst and hole formation. By the confluence or dilatation of cystoid spaces, or by both processes, large cysts may be formed.

The large, confluent cyst may resemble a flat detachment. There may be blood vessels in the inner wall of the cyst and the rupture of this wall will cause bleeding. The inner wall of the distended cyst is much thinner and protrudes into the vitreous. The external wall of all cysts is composed of nerve elements and is very sensitive to degeneration and hole formation.

Hole formation or rupture of the inner wall of the cyst has been reported by others although we did not see any cases in our col-

lection. We believe that vitreous adhesions to the delicate cystic wall added to senile liquefaction of the vitreous set the stage for slight trauma easily to precipitate a tear of the inner wall of the cyst. The location of the tear is likely to be at the site of the vitreous adhesion. Perforation of both inner and external walls of the cyst is the primary requirement for the creation of a retinal detachment.

The simple type of perforated hole should not be overlooked. It consists of a rupture of both inner and outer walls of a cystoid space. They must be more common than we were able to record since they are so difficult to find.

Summary

1. The general appearance of peripheral cystic degeneration of the retina is described in a study of 170 "normal" eyes.

2. Retinal cyst formation was found in 10. These were presented.

3. Incomplete hole formation was found in two cysts, a pseudohole in one case, and a penetrating simple hole in another case.

4. No retinal detachments were found.

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SPONTANEOUS UNILATERAL PULSATING EXOPHTHALMOS*

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Purpose

The purpose of this paper is to submit further evidence for the establishment of a more definite therapy in spontaneous sudden unilateral pulsating exophthalmos. The initial inspiration was from the late Dr. John M. Wheeler's exposition of exophthalmos with his exact descriptions of the subject and the problems of therapy involved. In response to his request that any similar experiences be recorded, this case is being presented.

History and Frequency

Benjamin Travers first reported on this subject in 1809. By 1908, de Schweinitz and Holloway found that 313 cases had been reported; 617 cases had been reported by 1928. These figures include all types of pulsating exophthalmos rather than the spontaneous unilateral exophthalmos considered here.

Cunningham states that the occurrence of pulsating exophthalmos is one case in 22,500; of these, 78 percent are traumatic in origin. In 1942, J. D. Martin gave a comprehensive review of all cases reported. He included 812 cases. Less than two percent of these were spontaneous and unilateral and relevant to this discussion.

Bedell, in 1914, and Zentmayer, in 1916, reported pertinent instructive cases. Robertson reported a case of pulsating exophthalmos due to the defective development of the sphenoid bone.

The subject has been completely reviewed since Martin's report by Benedict, Berens, Ruedemann, Spaeth, and others. There have been reported in the literature as of July 1, 1950, 470 cases of unilateral pulsating exophthalmos according to Benedict and Drescher. They reported 177 cases of asymmetric exophthalmos; 11 of these cases had an arteriovenous aneurysm as the cause for the unilateral exophthalmos, and only three of the 11 were spontaneous.

The only other case of spontaneous severe pulsating unilateral exophthalmos seen by me was in Philadelphia in 1929 on the service of the late Dr. William Shoemaker. Such a case once seen can never be forgotten.

Etiology

In considering this subject Drescher and Benedict have shown in their thesis that unilateral exophthalmos in exophthalmic goiter is relative rather than real because the supposedly offending eye shows only two mm. more exophthalmos than the opposite eye. A series of 100 cases demonstrates two mm. to be normal asymmetry.

The cause of pulsating exophthalmos can be better understood when we consider the fact that the cavernous sinus is the only place in the cranial cavity where a large artery passes through a venous formation providing anatomically the most common site for an intracranial lesion of this type. These lesions, however, are usually proven by postmortem findings.

Pulsation is transmitted from the brain and is synchronous with the pulse when caused by defects in the orbit. There is no bruit nor is the patient annoyed by the condition.

The opposite is true in arteriovenous communications. In orbitocranial connections, the pulsation of the eyeball is easily seen. In arteriovenous communications the pulsation is not readily seen but can be elicited by pressing the eyelid toward the orbit. There is also usually a marked dilation of the veins about the eyelids, the eyeball, and the frontal and temporal regions.

* Read before the ophthalmological section of the Texas Society of Ophthalmology and Otolaryngology, Austin, Texas, December, 1951.

We also know that, when the internal carotid aneurysm ruptures in the cavernous sinus, it is not in fact an arteriovenous aneurysm but a fistula. Anatomically the oculomotor, trochlear, ophthalmic, and abducens nerves are in direct relation to the cavernous sinus just inferior to the internal carotid artery during its passage through the cavernous sinus. Therefore pressure from the internal carotid artery can cause paralysis of the sixth nerve without affecting any other ocular or cranial nerve. Dr. Norma Elles, in her report of 1939, demonstrates the dynamics of this phenomenon although she does not mention the possibility directly.

When uncertainty exists as to whether the lesion is intracranial or extracranial arteriography can be used for localization. Since there is now a less than one percent fatality associated with the procedure, its use with the proper technique and contrast media is desirable when indicated.

The known contraindications, however, should be kept in mind. They are: advanced cerebral arteriosclerosis, extreme old age, severe cardiorespiratory disease, and known sensitivity to the contrast media.

When the use of arteriograms is contraindicated, Horton's method of sampling the blood from the jugular on each side is very helpful. In this procedure, the blood from the side of an arteriovenous connection will be of a darker color and have more oxygen capacity than blood from the opposite jugular vein.

Therapy

If the lesion is intracranial and demonstrably not in the cavernous sinus, the neurosurgeon should do the necessary surgery with a craniotomy. Dandy, Adson, and others have given resumes of their surgical procedures.

It can be concluded that an arteriovenous aneurysm is present in the cavernous sinus when compression of the carotid artery stops the bruit and pulsation. Ligation is then in order.

In this connection, Dorrance, in 1934, analyzed 69 internal carotid ligations and 82 common carotid ligations. The number of deaths was similar in each series. However, he found that the complications were greater and there were more recurrences following internal carotid ligations. There were twice as many hemiplegias and a third of them were permanent.

Recovery was reported in all hemiplegias following common carotid ligations. When retrograde flow of blood courses down the external carotid past its bifurcation and into the internal carotid, after ligation of the common carotid, the 50-percent flow of blood back up the internal carotid can further be curtailed by subsequent ligation of branches of the external carotid.

Ligation of the common carotid, with additional ligations as indicated, proved to be the procedure of choice in the 171 cases of pulsating exophthalmos reported by Sugar and Meyer.

Severance of the common carotid was the method chosen by Dr. R. N. Bartels in the case presented here. He recommended that severance be made as close to the heart as possible since it is axiomatic that the closer the ligation to the heart the more the collateral supply is preserved, thus lessening the possibility of complications.

As Dr. Benedict has wisely pointed out "the exercise of restrained judgment in the selection of the type of treatment to be employed in cases of exophthalmos of undetermined origin will prevent many costly mistakes."

Case report

Mrs. B. G., aged 41 years, was first seen on October 21, 1943, complaining of a heavy feeling behind her left eye. She was at this time referred by Dr. L. R. Talley, her physician.

A routine refraction was done, and the simple myopic astigmatism found was readily corrected to 6/6 vision in each eye. A 0.37D. sph. was given for near. The muscle balance for vertical and horizontal, both for distance and near, was well within normal limits and no latent hyperphoria was present. The Schiøtz tonometer tension at that time was 16 mm. Hg in each eye.

The external examination revealed normal lid margins and eyelashes and there was no pathologic condition of the lacrimal apparatus. The ocular movements were full and equal and the cornea and conjunctiva were clear. There was a good pupillary reaction and a normal anterior chamber depth in each eye.

The fundus examination of the right eye, under mydriatic, showed the media clear and the disc to have good outline and color. No abnormalities were seen in the macula or periphery. There were no cotton-wool deposits, but the arterioles around the macula were very small. There was a good foveal reflex.

The left eye was essentially the same. Bifocals were prescribed together with estrogenic therapy to be carried out by her physician. She was asked to return in three weeks if not relieved.

Mrs. B. G. was next seen five years later on November 15, 1948, when she was referred to me by Dr. Talley and Dr. J. B. Brown with a paralyzed left sixth nerve. At this time she had to hold her head to the left to eliminate diplopia, and her blood pressure was 185/110 mm. Hg. A history was elicited of a paralysis of the external rectus muscle of the left eye about one year previously.

A fundus examination on November 18, 1948, revealed no difference in the findings from October, 1943, except that the crossing phenomenon in the vessels was markedly increased and the arterioles were much smaller. There were no hemorrhages or cotton-wool like deposits.

Her entire physical examination, including electrocardiagram, neurologic survey, blood chemistry, X-ray and sedimentation tests, was within normal limits. Spinal puncture was advised and refused.

Since the Wassermann test was normal and there was no history of probable lues infection, mixed treatment, that is, small doses of iodine and mercury, was prescribed. The ophthalmologic diagnosis at this time was sixth nerve paralysis; cause undetermined.

One year later, on October 22, 1949, Mrs. B. G. entered the hospital with blood pressure of 198/100 mm. Hg. Dr. Brown called me shortly after midnight and reported that her left eye had "come clear out of her orbit and was sticking out on her face." He also reported that her lids were markedly swollen.

A large amount of sedation was advised with proper pressure to the closed lids. A probable diagnosis of severe sudden unilateral spontaneous pulsating exophthalmos was made as there seemed no other reason for such a catastrophe.

At eight o'clock the next morning, an external examination revealed the right eye unchanged. The left eye had a large amount of upper and lower lid edema. The eyeball was fixed aand chemotic. The cornea was clear but the pupil was half dilated and the globe was stony-hard on palpation. Marked pulsation of the upper lid was elicited only when it was forcibly pushed toward the apex of the orbit.

Exophthalmometer reading at this time was 38 mm. (Hertel) in the left eye and 12 mm. in the right eye. Vision at this time was 6/10 in the right eye and no light perception in the left eye.

By late afternoon the cornea was opaque and a bruit could be readily heard over the eye and in the left temple with the stethoscope and a definite thrill could be palpated on the left upper eyelid. She was semicomatose but with lucid periods.

At this time I advised preparation for ligation of the common carotid or the internal carotid, provided that digital occlusion of the common carotid caused the bruit to disappear without unfavorable effects on cerebration or signs of hemiplegia. After repeated occlusions with pressure over a two-day period, the period of digital occlusion was lengthened to 15 minutes with no unfavorable effects noted.

There was considerable pressure from the general surgeons for an enucleation as it was impossible to keep Mrs. B. G.'s eye covered with her eyelids even though canthotomy was done. All

Figs. 1-3 (Woodson). (1) Appearance of the patient on October 24, 1949. (2) Appearance on April 21, 1950. (3) Appearance of patient wearing eyepatch.

available methods of keeping the cornea moist were employed. There was no eye pain and the eye itself was insensitive to touch.

I feared that enucleation would cause an uncontrollable hemorrhage because of retraction of the vessels into the cranium. However, in order to eliminate rupture into Tenon's capsule, I did aspirate retrobulbarly without finding blood pooled there.

The front of the cornea became hard and had the consistency and appearance of dry gangrene. The source of her secondary glaucoma had, of course, precluded the use of any of the filtering operations.

After Dr. Bartels severed the common carotid her symptoms gradually improved. Her blood pressure dropped following the ligation, perhaps because of the pressure on the cervical sympathetic ganglion coincident with the ligation. The pressure around the eye became reduced gradually and the eye receded and became phthisical. There were some synechias in the cul-de-sac.

The eye was left intact with the idea of later placing an artificial eye on top of the moving eyeball since the cornea was nonsensitive and fibrous in character after the gangrenous covering sloughed from its surface. This phenomenon I had never seen before but I had in mind the use of a prosthesis over a nonsensitive cornea, as outlined by Burke of Minneapolis.

The patient was dismissed from the hospital on February 8, 1950, and at that time was in very good general condition with a vision of 6/7.5 in her right eye and no light perception in her left eye. There was no change in the fundus examination of the right eye. The left cornea was opaque.

Mrs. B. G. was very pretty and naturally her altered appearance depressed her. Because of the vascular accident that she had had, I advised that she not have even the simple surgery necessary for preparing the orbit for the use of a prosthesis. I feared that worry over the operation might precipitate another and perhaps fatal vascular catastrophe.

Later, with Dr. Talley's and my approval, she sought consultation at the University of Texas Medical School with Dr. Blocker, for plastic surgery. Because of certain signs of emotional instability we also advised that she be checked by Dr. Harris, the psychiatrist at the same institution.

An exhaustive psychiatric survey showed no contraindications for proceeding with the orbital repair, and this Dr. Blocker was ready to do. At this point the patient had a psychotic reversal that gave her a persecution complex, including criminal tendencies. This was in the spring of 1950. No operation was performed and since that date she has completely recovered from all of her emotional psychologic abnormalities. It was Dr. Talley's opinion and mine that this was not associated with the ligation but was a part of her abnormal climactic.

At present her hypertension is markedly reduced and she now wears a patch without abnormal sensitivity. The pictures you see of her before and after the operation reveal the results of a simple severance of the left common carotid, with attendant internal medical attention. Yesterday (December 6, 1951), when I talked to Mrs. B. G. she was well and happy.

In retrospect: the fact that she did not have a fullness of the veins over her left forehead area was because the aneurysm had been of such long standing (six years) that the dilation of the surrounding arteries had increased to the extent that the usual characteristic varicosities of the forehead never appeared.

Also, the left sixth nerve paralysis could have been caused by the pressure on it from the aneurysm in the cavernous sinus, on the floor, causing a cut out of the sixth nerve on the left side. Arteriograms were in order at the time I made the diagnosis of "left sixth nerve paralysis, cause unknown."

Summary and Conclusions

A case of spontaneous severe sudden pulsating unilateral exophthalmos of 38.0 mm. (Hertel) with recovery of the patient has been presented. References have been made to opinions on the therapy of this condition by current authorities.

Severance of the common carotid with additional ligations as necessary seems to be the procedure of choice. Severance of the common carotid was all that was necessary for recovery in this case. With no contraindications present, arteriograms should be used when the diagnosis is doubtful. It was not advisable or necessary to do an enucleation in this case. This condition should be kept in mind as it is invariably sudden and often catastrophic. Although the handling of these cases requires close and prompt coöperation from the neurosurgeon, general surgeon, internal medical specialist, and the ophthalmologist, it is clearly within the domain of the ophthalmologist to make the diagnosis and dictate the course to be followed.

601 Professional Building.

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CLINICAL ORBITONOMETRY IN GRAVES' DISEASE*

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In discussing the ocular changes of Graves' disease, many authors have mentioned the resistance of the orbital tissues to the backward displacement of the globe by digital pressure.[3,4,15,18,21,25,27] This resistance is the result of many factors conveniently grouped under the term "orbital tension." This term admittedly is not absolutely correct but seems to be in general use.

Estimation of orbital tension by digital means is much less accurate than digital estimation of intraocular pressure, the errors of which are well known to all ophthalmologists. The need for an instrument to measure orbital tension has been realized for many years. The German literature records several attempts at instrumental measurement, none apparently too successful.[11-13,17,23]

The need for such an instrument in the study of Graves' disease is well expressed by Means, who said that the measurement of orbital tension will also be important when it can be quantitated; that at present it can be only roughly approximated by palpation. This need is fulfilled by the orbitonometer, an instrument devised by Copper[5] in 1948. Means and Stanbury[23] have used this instrument and have expressed the belief that it meets the need for accurately measuring the orbital tension.

With the introduction of this instrument it was realized that some problems of the exophthalmos of Graves' disease might be investigated with it. Fralick[9] discussed the possibilities of the instrument in his recent paper on the orbit.

The present study was undertaken to evaluate the orbitonometer and determine its value in the management of patients with exophthalmos of Graves' disease. Before the details of this study are presented, however, a statement on the exophthalmos of Graves' disease is in order.

PRESENT STATUS OF EXOPHTHALMOS OF GRAVES' DISEASE

In this study the term "Graves' disease" has been used to avoid confusion in terminology since many of the cases were lacking in one or two of the triad of hyperthyroidism, goiter, and ophthalmopathy.

MECHANISM OF EXOPHTHALMOS

At the present time, there are three mechanisms that seem highly probable in the production of exophthalmos. They are (1) increase in the amount of orbital fat, (2) edema of the soft tissues of the orbit, and (3) enlargement of the extraocular muscles. In addition to these three factors, lymphocytic infiltration of the muscles and other soft tissues must be mentioned.

Basedow as early as 1840 expressed the belief that there was hypertrophy of the orbital tissues, especially the orbital fat. Smelser[31] expressed the opinion in 1937 that the exophthalmos was due to excess orbital tissue.

Rundle and Pochin,[30] in 1944, made chemical analysis for fat of the orbital contents in 17 cases of Graves' disease in which necropsy was performed, and expressed the opinion that increase of fat caused the proptosis.

Merrill and Oaks[23] found increased fibrofatty tissue in the orbit at necropsy in a severe case. Dobyns[6] showed that the extra-

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ocular muscles of animals treated with thyrotropic hormone develop an increased fat content.

Enlargement of the extraocular muscles is thought to be the cause of exophthalmos by many, at least in the severe progressive types of the condition. This was pointed out by Moore[24] in 1920. Burch found these muscle changes in a case of severe exophthalmos in 1929 and made an excellent report of the pathologic features.

Naffziger[26] emphasized these changes in 1933. In his cases, in which the condition was very severe, the muscles were found to be enlarged three to eight times their normal size.

Thyrotropic hormone

The thyrotropic hormone of the pituitary gland has been thought by some authors to play a part in the production of these orbital changes. Experimentally, exophthalmos has been produced in animals by injection of this hormone. Marine and Rosen,[19] Smelser,[33] Albert,[1] Dobyns, and others have demonstrated this.

It has been pointed out that the effect of thyrotropic hormone in animals may not be applicable to man; however, Stallard[34] reported a case of Graves' disease that progressed to the loss of one eye following injections of thyrotropic hormone.

It is of interest that patients with myxedema may have high urinary values for thyroid-stimulating hormone but rarely have exophthalmos. It must be kept in mind, though, that current methods of determining thyroid-stimulating hormone do not necessarily tell the whole story regarding this hormone.

The thyroid hormone is suspected of having an inhibitory effect on the output of thyrotropic hormone by the pituitary gland. According to this idea, any break in the pituitary-thyroid axis in which the inhibitory effect of thyroxin is removed might then lead to exophthalmos.

Soley,[32] and later Dobyns and Haines,[7] found that thyroidectomy in cases of Graves' disease was usually followed by increased prominence of the eyes. If hypothyroidism supervened, the prominence usually increased still further. In most of their cases the change in the position of the globe was so slight that it could not be detected without measurement.

Zimmerman[36] called attention in 1929 to the development of exophthalmos after thyroidectomy and felt that the exophthalmos differed from the usual variety. He used the term "paradoxical exophthalmos." Brain[2] used the name "exophthalmic ophthalmoplegia."

In 1940, Jensen[14] applied the term "malignant exophthalmos" to those cases in which the condition progressed rapidly following resection of the thyroid gland. Mulvany used the term "thyrotropic exophthalmos" to refer to that group of cases in which the abnormality is malignant in its progression whether postoperative or not.

Many attempts have been made in recent years to separate the exophthalmos of Graves' disease into two distinct entities. The advocates of this dualistic theory stress several points to uphold their beliefs. The "thyrotropic" type is thought to occur later in life than the thyrotoxic type, to occur more frequently in males, to have more subjective features such as pressure sensations behind the eyes, and not to be related to the degree of hyperthyroidism. Patients with this type of exophthalmos are also thought to have a different type of weakness of the extraocular muscles, no retraction of the lids, and more edema and chemosis of the lids. The orbital tension is thought to be increased and sometimes stony resistance is encountered on attempting to push the globe back into the orbit.

Means in a more conservative approach refers to this severe type of protrusion as the "hyperophthalmic type" and separates it from the classic type in degree only. He has expressed the belief that these types are variations of the same process and not separate distinct entities. Martens[20] has expressed the same view. We also have not been able to separate cases with the exophthalmos of Graves' disease into two such types.

The orbitonometer

Description

The instrument used in our investigation is manufactured by C. W. Dixey and Son, Ltd., London. It resembles the familiar Hertel exophthalmometer in some respects. It consists of three separate parts (fig. 1): (1) the supporting bridge, (2) the dynamometer, and (3) the contact shell.

The supporting bridge is adjustable to the width of the patient's interorbital measurements and the set screws lock it in this position. The bridge is supported on the patient's lateral orbital rims by a notched flange on each leg of the instrument. The nose support is also adjustable and may be locked by a set screw. As will be explained later, the nose support does not actually support the instrument, but merely stabilizes it in a vertical position. The headband is made of an elastic material and is also adjustable.

The dynamometer is a cylindric rod approximately 25 cm. long, with a spring in the handle. It is calibrated to produce 100 to 400 gm. of pressure when downward pressure is applied to the handle. The calibration marks for the degree of pressure are on the upper portion of the stem and are read as they enter the handle. The lower portion of the stem is calibrated in millimeters and the degree of exophthalmos is read here.

As can be seen in Figure 2, if the zero is resting at the top of the horizontal bar of the supporting bridge, the inside surface of the contact shell is tangent to a plane passing through the lateral orbital rim. Therefore the height of the cornea above the lateral orbital rim may be read directly from the millimeter scale.

The plastic contact shells are of three sizes of varying corneal diameters and radii of curvature. The outer surface of each contact shell has a receptacle for the end of the stem of the dynamometer.

Use of the instrument

A drop of 0.5-percent solution of tetracaine (pontocaine) is instilled in each eye and, while the effect is awaited, the contact shell is cleansed in alcohol, rinsed in distilled water, and dried.

With the patient in the sitting position the

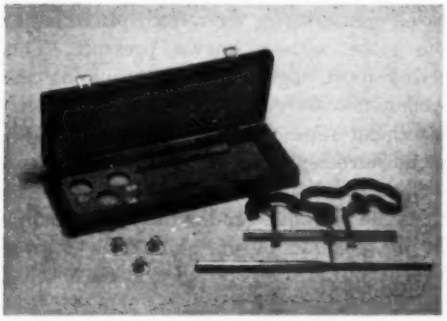

Fig. 1 (Kearns, Henderson, and Haines). Orbitonometer.

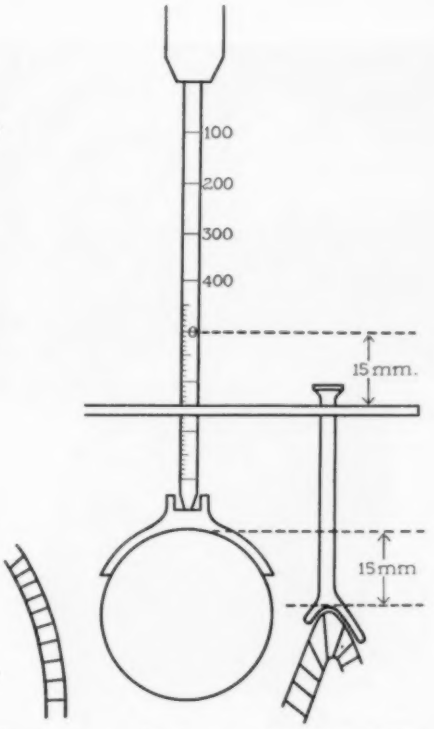

Fig. 2 (Kearns, Henderson, and Haines). Calibrations of the orbitonometer.

supporting bridge is positioned on the orbital rims. This is best done by having the patient support one side of the instrument on the orbital rim by slight pressure with one finger on the flange of that side. The patient's help is of value in placing the instrument since it is rather uncomfortable if not resting properly across the orbital rims. The other side is adjusted on the orbital rim with the elastic headband, just enough pull being exerted to assure firm support.

The nose piece is slid into position and lowered until it makes contact with the bridge of the nose without changing the distance of the horizontal bar from the patient's eyes. The instrument will now support itself and the nose piece prevents it from tilting upward or downward.

The back of the chair is lowered and the patient reclines. Care is taken to keep the head level so that, with the eyes in the primary position, the visual axis is vertical. The instillation of a second drop of tetracaine at this time produces sufficient corneal anesthesia to allow introduction of the contact shell. The inner surface of the shell is lubricated with a bland ointment and the shell is inserted between the lids in the manner of a prosthesis.

Fig. 3 (Kearns, Henderson, and Haines). Orbitonometer in position for measurements.

The cornea is visible under the plastic shell and the globe may be kept in the proper position by having the patient watch the examiner's finger with his uncovered eye. Figure 3 shows the instrument in place.

The first reading is made holding the dynamometer in a vertical position with no pressure applied. The weight of the dynamometer has not been found to influence the first reading. This initial reading is a measurement of the height of the cornea above the orbital rim in millimeters.

Pressure is applied until the 100-gm. mark on the dynamometer stem is reached and the new position is read on the millimeter scale. A lapse of a few seconds should be allowed for the time required for the reading to become stationary. The positions with pressures of 200 and 300 gm. are then made in a similar manner. The pressure is gradually released, the contact shell is removed, and the procedure is repeated on the other eye.

Recording of readings

The method of recording used by Copper seemed satisfactory and simple and was therefore used in this study. This system is based on measuring the retrodisplacement of the globe with a known pressure. This seems more logical than determining the weight necessary to produce a certain displacement since some globes may have little or no retrodisplacement.

Two values are used. The first is referred to as the "E value" and is the direct reading of the position of the globe with a given pressure. It is also referred to as the absolute value.

E_0 represents the original position of the cornea in relation to the orbital rim with-

out any pressure. E_{100} represents the new position of the cornea using the 100-gm. weight, E_{200} using the 200-gm. weight, and E_{300} using the 300-gm. weight.

The Y values represent the millimeters of retrodisplacement or the relative values. Therefore Y_{100} is the amount of retrodisplacement with the 100-gm. weight or $(E_0\text{-}E_{100})$. Y_{200} is $(E_0\text{-}E_{200})$ and Y_{300} is $(E_0\text{-}E_{300})$.

The instrument is calibrated in millimeters and may be read to the nearest half millimeter.

Experience gained in the use of the instrument.

Copper used a total weight of 400 gm. in his measurements and Georg[11] used the astounding pressure of 500 gm. By self-experimentation the 300-gm. pressure was found to be definitely uncomfortable and the 400-gm. weight was not attempted.

The instrument with 300 gm. applied gives one a feeling that is very much akin to that described by a patient who has experienced acute glaucoma. For this reason all the measurements were made with 300 gm. as the upper limit. All the patients admitted that the procedure was not pleasant but only a few could not bear the discomfort.

In our opinion the only contraindications to the use of the instrument are ocular abnormalities in which manipulation of the globe might cause further damage. Ocular diseases with hemorrhagic manifestations, retinal detachment, acute inflammation and glaucoma are felt to be definite contraindications.

Patients with marked cardiac arrhythmias did not undergo measurements because it was feared that the bulbocardiac reflex might have an adverse effect. Several patients with senility and auricular fibrillation were excluded. No ill effects on the patients have been observed to date from the use of the instrument.

It was found in a few cases that, after release of the pressure, the contact shell would form a vacuum on the cornea and would resist attempts at removal. The examiner found himself in this embarrassing situation on several occasions. Indentation of the globe near the margin of the shell was found to release the vacuum and to allow removal. This hazard was overcome by having the optician drill a small hole near the apex of the contact shell. No further trouble like this has occurred.

Measurements

Normal

Measurements were made on 28 eyes of 14 patients without recognizable thyroid disease and without exophthalmos. The results of these measurements are given in Table 1. Even with this small number of cases it was found that the values agreed very closely with the values for normal persons given by Copper. His results were based on measurements made on 60 normal adults and are given in Table 2. Figure 4 shows the means of both series graphically.

In studying these curves and the ones to follow, it is seen that three components are of importance. The first is the upper starting point which, as has been mentioned previously, represents the initial height of the cornea above the orbital rim. The second component is the final end point of the curve which represents the retrodisplaced position

TABLE 1

Measurements made on 28 eyes of 14 patients without recognizable thyroid disease and without exophthalmos

	Y_{100}	Y_{200}	Y_{200}
Mean	3.6	5.6	6.7
Standard deviation	0.8	0.6	0.6
95 percent limits	2.0–5.2	4.4–6.8	5.5–7.9

TABLE 2

Measurements made on 60 normal adults by Copper

	Y_{100}	Y_{200}	Y_{300}
Mean	3.6	5.8	6.8
Standard deviation	0.8	0.9	1.0
95 percent limits	2.2–5.2	3.9–7.6	4.8–8.7

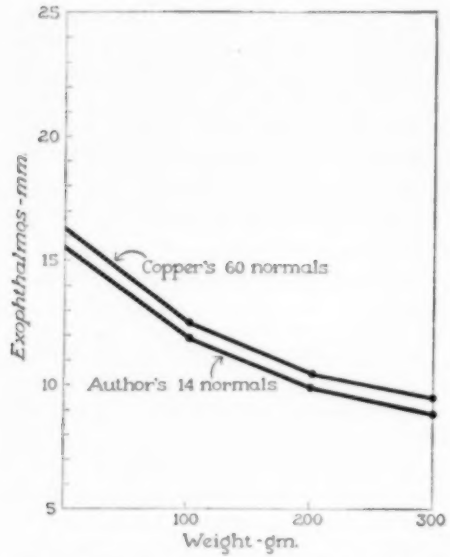

Fig. 4 (Kearns, Henderson, and Haines). Average orbitonometric measurements for the 14 normal persons herein reported and for Copper's 60 normal persons.

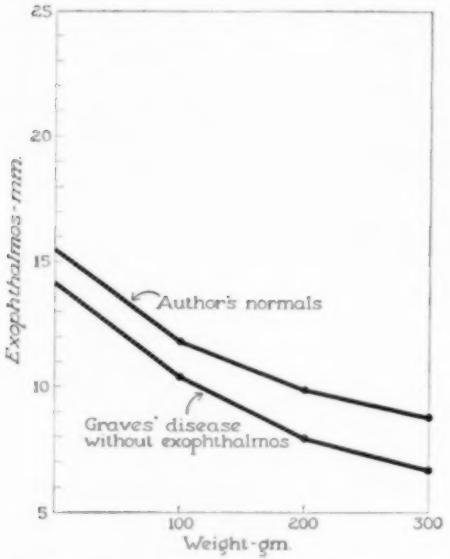

Fig. 5 (Kearns, Henderson, and Haines). Average orbitonometric measurements for patients with Graves' disease without exophthalmos compared with those for normal persons.

of the globe with the 300-gm. weight. The third component is the slope of the curve.

It is seen that the slope for normal eyes is a gradual symmetrical one which levels off toward the higher weights. This curve is found to be flattened in some of the cases of exophthalmos, as will be shown later.

Graves' disease

The degree of exophthalmos of the 77 patients with Graves' disease was graded arbitrarily on the basis of 1-plus to 4-plus as follows: height of cornea above the orbital rim 17 mm. or less, 0; 18 to 20 mm., 1-plus; 21 to 23 mm., 2-plus; 24 to 26 mm., 3-plus; and 27 mm. or more, 4-plus.

The exophthalmos was determined with the orbitonometer and the exact measurement of the height of the cornea above the orbital rim to the nearest half millimeter was noted. It is difficult to set a definite dividing line between exophthalmic eyes and normal ones. However, for purposes of statistical review the foregoing scheme of grading was used and is believed to offer a satisfactory classification.

The basal metabolic rate was determined the same day as the orbitonometer measurements in the majority of the cases and in no case more than five days before or after examination.

Paresis of ocular muscles was noted and judged on objective findings. Only those patients who exhibited definite muscle weakness are included under this heading.

The patients who had undergone operations on the thyroid gland before the measurements were made were noted. None of the operations were recent and in all cases subtotal thyroidectomy apparently had been done, although many had been done elsewhere and the exact procedure was unknown.

Several other characteristics of the cases were recorded at the time of the measurements, such as the degree of lid retraction, the presence of edema and chemosis, and the sensation of pressure behind the globe. However, these factors were found to be too

subjective and variable for statistical analysis. Even among the physicians seeing the patients there was a variance of opinion as to the presence or absence of some of these signs.

Graves' disease without demonstrable exophthalmos

Twenty-three of the 77 patients with Graves' disease had E_0 readings of less than 18 mm. and were therefore classed as not having exophthalmos. The curve for this group as shown in Figure 5 is found to differ very little from that of the normal persons. The slope of the curve is almost identical, while the average total displacement is 7.5 mm., slightly more than the normal of 6.7 mm.

The curve for the patients with Graves' disease is lower than the normal because a few of the normal patients have an initial E_0 reading greater than 18 mm. It appears that patients with Graves' disease without exophthalmos have approximately the same orbital tension characteristics as do normal patients.

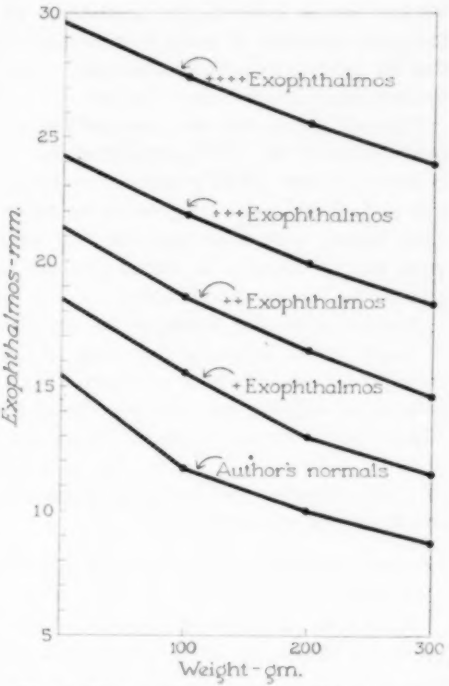

Fig. 6 (Kearns, Henderson, and Haines). Average orbitonometric measurements for patients with various grades of exophthalmos.

Graves' disease with exophthalmos

When the patients with exophthalmos were divided into groups in regard to severity it was found that 24 had 1-plus exophthalmos, 16 had 2-plus exophthalmos, 10 had 3-plus exophthalmos, and four had 4-plus exophthalmos. Figure 6 shows the means of the groups graphically.

As can be seen, the total displacement was decreased in direct proportion to the degree of exophthalmos. In other words, as the average exophthalmos increases, the average orbital tension increases. It is interesting to note here that Copper found a correlation between the prominence of the eyes and the orbital tension in his series of 60 normal adults, but the correlation was the reverse of that found here. He found that the orbital

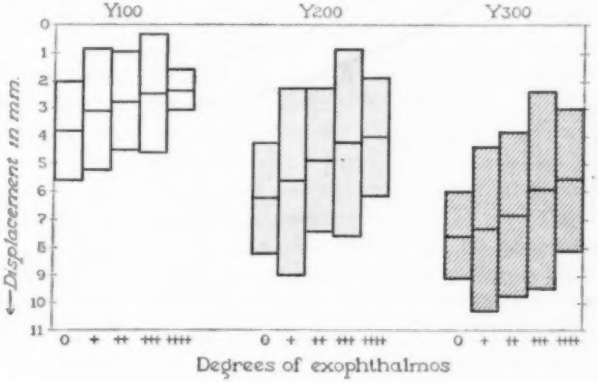

Fig. 7 (Kearns, Henderson, and Haines). This illustrates the decrease in retrodisplacement of the globe that occurs as exophthalmos increases. The blocks represent 95-percent limits (two standard deviation units from the mean).

tension became lower as the prominence of the eyes increased. It must be remembered that his patients were without definite exophthalmos and without Graves' disease.

Figure 7 shows that the tendency for orbital tension to increase as exophthalmos increases is present for all grades of exophthalmos and all determined degrees of pressure. This finding is of importance since it suggests that the increase in orbital pressure is responsible for the exophthalmos.

Another interesting finding of this analysis of cases is the increased flattening of the curve as the exophthalmos increases. This is difficult to explain, but was also noted by Copper in his measurements in Graves' disease. He referred to it as the "edema type" of curve. Whether this flattening is actually due to edema is questionable.

Orbital pressure in relation to other factors

Forty-four patients had a basal metabolic rate of +11 percent or more, while 33 had a basal metabolic rate of +10 percent or less. Figure 8 shows the means for these two groups. Although the group with lower basal metabolic rate tended to have a higher degree of exophthalmos, little difference was found in either the slope of the curve or the total retrodisplacement.

Thirty-one of the patients had undergone previous operations on the thyroid gland. Figure 9 shows that these patients differed very little in respect to slope of curve or total retrodisplacement from those who had not undergone such operations. Like the group with lower basal metabolic rate, these patients with previous thyroidectomy tended to have a higher degree of exophthalmos.

Twenty-one of the 77 patients had definite muscle paresis. Figure 10 shows that this group of patients had a higher average orbital tension than did those without paresis, and there was characteristic flattening of the curve. This suggests that there is a correlation between the orbital changes and the muscle paresis.

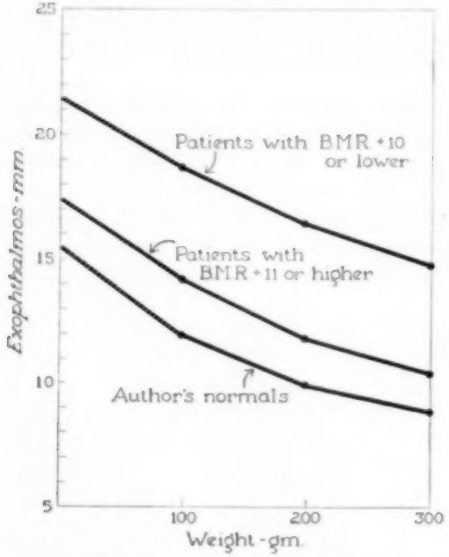

Fig. 8 (Kearns, Henderson, and Haines). Average orbitonometric measurements for patients with a basal metabolic rate of +10 percent or lower and for patients with a basal metabolic rate of +11 percent or higher.

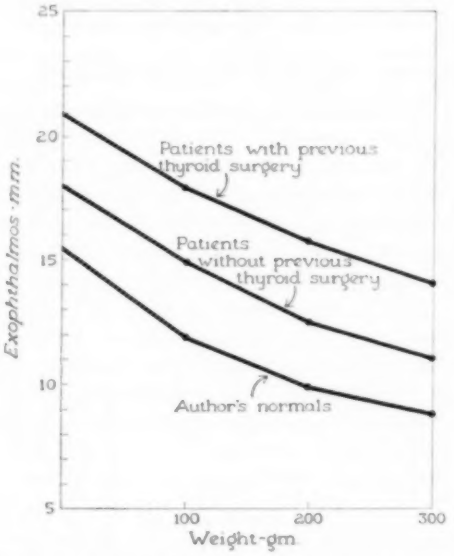

Fig. 9 (Kearns, Henderson, and Haines). Average orbitonometric measurements for patients with and for those without previous operations on the thyroid gland.

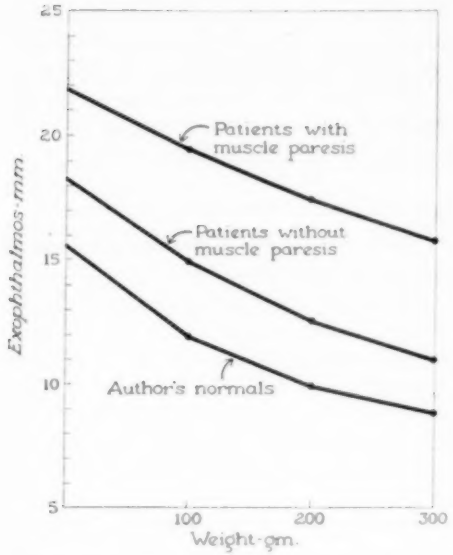

Fig. 10 (Kearns, Henderson, and Haines). Average orbitonometric measurements for patients with and for those without muscle paresis.

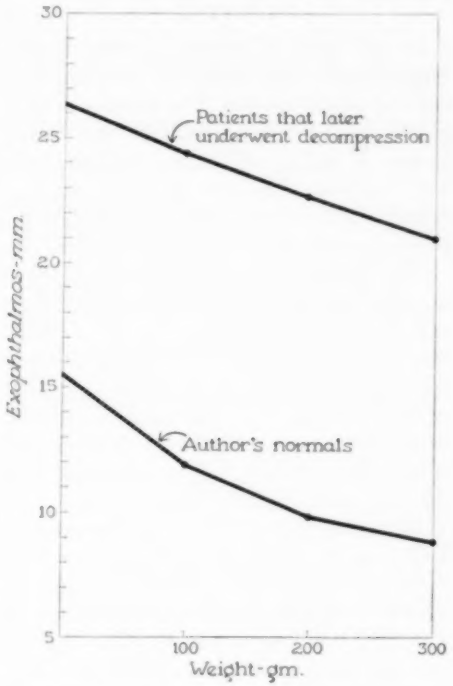

Fig. 11 (Kearns, Henderson, and Haines). Average orbitonometric measurements for patients who later underwent an operation for orbital decompression.

Three of the patients later underwent orbital decompression by the transfrontal method. These were naturally cases of extreme exophthalmos. Before operation each of these patients was found to have a much lessened retrodisplacement than usually occurs, and a very flattened curve. Figure 11 shows the means of the measurements for these patients.

The instrument as an exophthalmometer

We agree with Copper in feeling that the orbitonometer gives a more accurate measurement of the degree of exophthalmos than does the Hertel instrument. The latter instrument is known to vary, depending on the base line. This variance is due to the introduction of parallax by the mirrors. The orbitonometer gives the actual millimeters of exophthalmos while the Hertel instrument gives figures that represent an index that is meaningless unless the same instrument and base line are used for subsequent readings.

It is interesting to note that the average normal values obtained with the Hertel instrument are higher than those obtained with the orbitonometer. Copper's average reading with the orbitonometer was 16.2 mm. for his series of 60 normal adults while our readings for 14 normal persons averaged 15.5 mm.

Using the Hertel instrument, Drescher and Benedict[8] found 17.3 mm., Wagener[28] found 15 to 20 mm., and Ruedemann[29] found 18.8 mm. as an average normal reading. Galli-Mainini[10] using the Luedde exophthalmometer, which is a form of direct reading instrument, found the readings for 50 normal patients to be within range of 14 to 17.5 mm.

The Hertel instrument has the advantage of simplicity in general usage. When more accurate readings in actual millimeters are needed the orbitonometer will be found valuable.

Comment

In this study a definite correlation was found between the degree of exophthalmos and the orbital tension. The patients with a greater degree of exophthalmos were found to have a higher orbital tension, and there was a gradual variation of orbital tension from normal to abnormally high tensions depending on the degree of exophthalmos.

This finding lends support to Mean's theory that the exophthalmos in the classic type and the hyperophthalmic type of Graves' disease are variations of the same process and not separate entities. It is also in agreement with the findings of Rundle and Pochin who noted that the percentage increase in the bulk of the orbital tissues could be correlated with the degree of exophthalmos.

No correlation could be found between orbital tension and basal metabolic rate. The orbital tension in those patients who had undergone operations on the thyroid gland did not differ from the tension in those who had not undergone such operations. There was a suggestion that patients with muscle paresis tended to have higher orbital tension than did those without paresis.

During the study the internist found the measurements valuable in that accurate determinations of the exophthalmos were obtained. An accurate record of the degree of exophthalmos was possible because the instrument employs a direct reading in millimeters, free of errors from parallax.

Summary

The present status of the exophthalmos of Graves' disease is reviewed.

An instrument, the orbitonometer, is described which makes possible the accurate measurement of the resistance of the globe to retrodisplacement. The resistance to retrodisplacement is referred to as orbital tension. The procedure for using the instrument to measure orbital tension and the actual extent of exophthalmos in millimeters is described.

The 28 eyes of 14 normal persons were measured and the results were found to have a high correlation with previously reported results. The orbital tension of 77 patients with Graves' disease was measured and the findings analyzed. The tension was found to be increased proportionally to the degree of exophthalmos.

The Mayo Clinic.

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Ophthalmic Miniature

About three months after lying-in, while she was suckling her child, a lump of about the size of a walnut was perceived in the right side of her neck. This continued to enlarge till the period of my attendance, when it occupied both sides of her neck, so as to have reached an enormous size, projecting forwards before the margin of the lower jaw. The part swelled was the thyroid gland. The carotid arteries on each side were greatly distended; the eyes were protruded from their sockets, and the countenance exhibited an appearance of agitation and distress, especially on any muscular exertion, which I have rarely seen equalled (1786).

Caleb Hillier Parry, *Collected Works*, 1825.

(Editor's Note: This description of exophthalmic goitre preceded that of Flajani by 14 years, Graves by 49 years, and Basedow by 54 years.)

A METHOD OF AVOIDING HAMMOCK PUPIL IN CASES OF VITREOUS LOSS IN CATARACT EXTRACTION*

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The purpose of this paper is to call attention to a simple method of preventing the updrawn or hammock pupil which often occurs after the loss of vitreous in cataract extraction.

Kirby[1] has said that extensive incarceration of the iris after vitreous loss will result in a markedly distorted pupil which in extreme cases will be hammock-shaped or even updrawn, so that no pupillary opening remains. Similar observations have been made by other surgeons.

Various procedures have been recommended to rectify this condition after it has occurred. In reading descriptions of these procedures one is led to believe that they are easy to carry out but, when actually confronted with the problem, one finds that such operations are usually difficult and uncertain in their end results.

It is difficult to cut the iris with a needle-knife without some tearing or pulling of the iris tissue. Using scissors for reëstablishment of a pupillary opening is likely to cause more vitreous loss.

Stallard[2] has mentioned doing an iridotomy at the inferior portion of the iris as a precaution against hammock pupil, but does not say how or when it should be done.

Chandler[3] observed (1938) that a higher percentage of pupillary membranes and updrawn pupils occurred after cataract extraction in patients who had posterior synechias from previous iridocyclitis. Because of this observation, in addition to freeing the synechias, he began to make a radial cut in the iris through the sphincter toward the root at the 6-o'clock position. This type of sphincterotomy often produced a pupillary contour which appeared almost normal and in which one would not suspect on superficial observation that a sphincterotomy had been done. The vision was usually good.

He advocated the procedure to avoid another operation and stated that it was simple and safe when done before extraction as the lens protected the vitreous.

He has used an inferior sphincterotomy as a routine procedure in cases where there had been an iridocyclitis or a previous filtering operation for glaucoma.

In iridocyclitis of the usual type or in that which often occurs following a filtering operation, a fibroplasia of the iris may occur which renders the iris more rigid. With such an iris, if a small portion prolapses or becomes attached to the wound, marked pupillary distortion is prone to develop. In such eyes the vitreous tends to form fibrous strands which also contribute to the distortion of the pupil.

Experience has shown that a radial sphincterotomy can be done after extraction of the lens as well as before and after loss of vitreous with equal facility and with equally good results.

PREVENTION OF VITREOUS LOSS

Benedict,[4] Bracken,[5] Dunnington,[6] Berens,[7] and others have written about and agree on the procedures which should be carried out preoperatively to prevent vitreous loss. Among the most important measures are the proper sedation of the patient, good topical anesthesia, orbicularis akinesia by the use of O'Brien or Van Lint method, and a retrobulbar injection of novocaine and ephedrine to anesthetize the ciliary ganglion and to produce extraocular muscle akinesia. Preplaced corneoscleral sutures are favored by a large majority of ocular surgeons at the present time.

* Read at the 21st annual mid-winter clinical convention of the Research Study Club of Los Angeles, January, 1952.

Since the publication of Atkinson's[8] paper on the use of hyaluronidase in local anesthesia in November, 1949, many surgeons have found this substance useful in reducing frequency of vitreous loss.

There is also general agreement on the measures to be taken to reduce the occurrence of vitreous loss during operation.

If the vitreous presents before the lens is delivered, the time-honored method of removing the lens has been with the loop or with the tenaculum. At present some surgeons prefer the erisophake if there is not too much vitreous in front of the lens. Most surgeons agree that a full iridectomy should be done, the viscid vitreous outside the eye should be cut off with scissors, an attempt should be made to reposit the iris pillars and the wound should be closed as soon as possible by tying the corneoscleral sutures.

Temporary removal of the speculum and closure of the lids after loss of vitreous, as has been advocated in the past, rarely accomplish anything and it is usually better to continue with the operation if the patient is reasonably quiet.

Some surgeons believe a bubble of air is useful in cases in which vitreous has been lost, and others are convinced that air is detrimental.

Case report

Six cases are presented in which vitreous loss occurred during cataract extraction and in which a sphincterotomy of the iris was done at the 6-o'clock position at the time of operation. Three of these were done by me and three were done by residents whom I was assisting.

In five cases the vitreous presented before delivery of the lens, in one case after delivery. Three of the sphincterotomies were done before extraction and three afterward.

All patients had been given barbiturates two hours before and demerol one-half hour before surgery. Procaine solution (one percent) to which one drop of 1/1,000 epinephrine for five cc. of procaine had been added, was used for akinesia according to the method of Van Lint. After the usual preparation and draping, a retrobulbar injection of one cc. of the same solution was made.

All six cases were done before we began using hyaluronidase. Since then the need for the use of the operation has not occurred.

A Lancaster type of lid speculum was used; a 4-0 silk, superior rectus, stay suture was applied. A conjunctival flap of three to four mm., concentric with the limbus, was dissected down from above from the 3-o'clock position around to the 9-o'clock position.

Corneoscleral grooves were made with a Bard-Parker knife at the 10-o'clock and the 2-o'clock positions. A 6-0 Anacap, McLean-type[9] suture was passed through the edges of the corneoscleral grooves. An incision with the keratome was made at one side of the 12-o'clock position (to facilitate doing an iridectomy), and the wound was enlarged in both directions with the Castroviejo scissors.

The sequence of events in the six cases from this stage on was as follows:

Case 1 (fig. 1)

G. W., a man, aged 62 years, was operated on July, 1949.

After incision with the keratome, the iris prolapsed followed by the vitreous. A full iridectomy was performed. The lens was delivered with the Weber loop. The McLean sutures were tied. The vitreous in the wound was trimmed off with scissors.

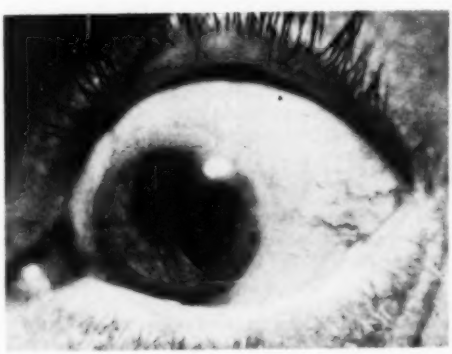

Fig. 1 (Smith). *Case 1.* Photograph taken 26 months after operation.

The closed blades of the Knapp iris scissors were passed into the wound between the sutures from above with the broad surface of the blades parallel to the plane of the iris. The points were passed downward to the iris border at the 6-o'clock position and the scissors were rotated slightly about their long axis, opened so that one blade was in front of the iris and the other behind, pushed two mm. farther down, and then closed to divide the iris sphincter. No additional vitreous was lost by this procedure.

The patient was last seen on September, 1951. Refraction was: O.S., +12.0D. sph. ⊃ +1.5D. cyl. ax. 150° = 20/20—3; add, +2.75D. = J3.

CASE 2

E. F. B., a man, aged 29 years, was operated on September, 1949. The patient was exposed to a dynamite-cap explosion on Guam on February 6, 1948.

Examination on June 6, 1949, revealed multiple small foreign bodies in both eyes and in the upper lids of both eyes. The vision of the right eye was 20/50 with a +3.0D. sph. ⊃ +0.75D. cyl. ax. 100°, and he was able to read J8.

There were many corneal scars and numerous nonferrous foreign bodies in the cornea and within the eye. There were anterior and posterior subcapsular opacities and many vitreous opacities, due to the foreign bodies or their passage through the eye.

The vision of the left eye was limited to light perception, light projection, and color perception. There were posterior synechias at the 3-o'clock and 12-o'clock positions, and at the 3-o'clock position, at the limbus, there was a hole in the iris. There was a dense traumatic cataract with anterior capsular folding. The pupil dilated well, except for the areas of synechias.

During the operation a full iridectomy was done and the anterior capsule was grasped with a Fuchs forceps and a large piece was removed. Some of the lens debris was removed by irrigation but there appeared to be a dense posterior subcapsular membrane. It resembled an after-cataract.

A sphincterotomy was done as has already been described, but the McLean sutures had not been tied. The posterior subcapsular membrane was then grasped with a Fuchs forceps and cut vertically with the scissors. Vitreous was expected. It presented and was semiviscid. The extruded vitreous was cut off and the sutures were tied.

On January 25, 1950, with a +12.5D. sph. ⊃ +0.75D. cyl. ax. 180°, the patient's vision was 20/25—2 and with a +3.0D. add he was able to read J2. At this time there was no hammock pupil and there was an adequate pupillary opening, even though there was a partial membrane.

CASE 3

W. A. M., a man, aged 56 years, was operated in February, 1950. Intracapsular cataract extraction with full iridectomy had been performed on the right eye on March 2, 1948. On January 14, 1950, with a +12.5D. sph. ⊃ +1.0D. cyl. ax. 130°, he obtained 20/20 vision and with a +2.5D. add he read J1.

The left eye had a mature cataract and the vision was limited to light perception, light projection, and color perception. On February 2, 1950, a cataract extraction was attempted with the Bell erisophake and, during the procedure, the suction cup lost its grip.

The lens dislocated into the vitreous and at the same time vitreous presented in the nasal side of the wound. The lens was delivered without difficulty with a Weber loop combined with a little pressure below the limbus. A peripheral iridectomy had been performed at the 12-o'clock position before application of the erisophake. The McLean sutures were tied at the 10- and 2-o'clock positions.

The vitreous which protruded was cut off with the scissors. The iris did not tend to prolapse into the wound, so a full iridectomy was not done. After the sutures were tied the Knapp iris scissors were introduced into the limbal wound between the sutures, so that the blades were in a horizontal position. As the blades approached the iris sphincter at the 6-o'clock position, the sphincter tended to recede, but was cut for about two mm. without hemorrhage. The scissors were removed without further loss of vitreous.

A bubble of air was introduced into the anterior chamber and the vitreous receded without further vitreous loss. Eserine ointment (0.5 percent) was instilled into the conjunctival sac and both eyes were bandaged.

The next morning there was still a small mobile bubble of air at the 12-o'clock position, and the remainder of the chamber was filled with aqueous. The pupil was small. There was a moderate amount of striate keratitis which cleared considerably during the next day. Seven days after the operation the conjunctival flap was firmly adherent and the iris remained in position.

Six months later with a +12.0D. sph. ⊃ +2.0D. cyl. ax. 170°, the vision was 20/40 and, with an add of +2.5D., he was able to read J8. The pupil was not updrawn.

CASE 4

J. M., a woman, aged 65 years, was operated in September, 1949. Examination of the right eye revealed a mature cataract. The vision was limited to light perception. Vision of the left eye was 5/200.

At surgery a keratome incision was made. After enlarging the wound with the scissors, the iris tended to prolapse at the 12-o'clock position, vitreous presented, and there was considerable loss of fluid vitreous. Iris sphincterotomy was performed at the 6-o'clock position before tying the suture, after which a full iridectomy was performed.

At the end of two months the result was satisfactory. After that the patient disappeared.

CASE 5 (fig. 2)

F. O., a man, aged 67 years, was operated in December, 1949. Examination of the right eye re-

vealed immature senile cataract with considerable opacity in the axial area. Vision was limited to counting fingers at three feet. Two-point discrimination was good, as was light and color perception. The left eye was blind from an occlusion of the central retinal artery.

At surgery a keratome incision was made at the 12-o'clock position. The anterior chamber did not collapse and a bead of vitreous presented superiorly and temporally. The lens was dislocated superiorly and temporally. The wound was enlarged with the scissors and sphincterotomy was done before cataract extraction. The lens was delivered with the erisophake. As the cataract was withdrawn, it was noted that there was vitreous clinging to the posterior lens surface. The sutures were tied after delivery of the lens and a full iridectomy was performed at the 12-o'clock position.

On January 2, 1950, an inferonasal choroidal detachment was observed, which disappeared by January 23, 1950. On January 16, 1950, with a +14.5D. sph. ⊃ +3.0D. cyl. ax. 180°, the patient obtained 20/40 vision and with an add of +3.0D. he was able to read J6. (Figure 2 was taken on January 17, 1950.)

Fig. 2 (Smith). *Case 5.* Photograph taken 20 days after operation.

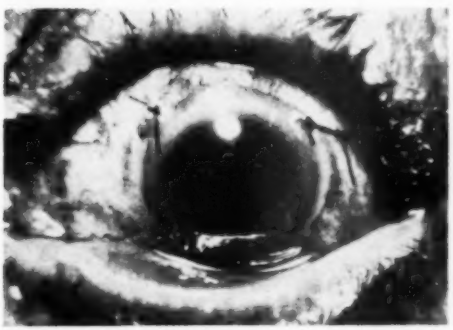

Fig. 3 (Smith). *Case 6.* Photograph taken 10 days after operation.

CASE 6 (fig. 3)

E. O. L., a man, aged 62 years, was operated in January, 1950.

The patient stated that he had been struck in the left eye by a peach two years previously and had experienced failing vision of the left eye for a year and a half. The vision was limited to light perception by a mature cataract and there was iridodonesis. The right eye was normal.

At surgery, as soon as the anterior chamber was opened, liquid vitreous presented. A full iridectomy was done and a sphincterotomy was performed before delivery of the lens with the Bell erisophake. The zonule of the lens had been separated inferiorly and laterally. There was very little postoperative reaction.

SUMMARY AND RESULTS

Two cases were followed for 26 months (Cases 1 and 2). Each had 20/20 vision, J3 and J6 respectively.

Case 3 was followed for six months and had 20/40 vision and J8.

Cases 4, 5, and 6 were clinic cases and disappeared after from one to two months but, when last seen, the eyes were quiet, there was no updrawn pupil, and there was a clear pupillary aperture.

What I believe to be the ideal way to do

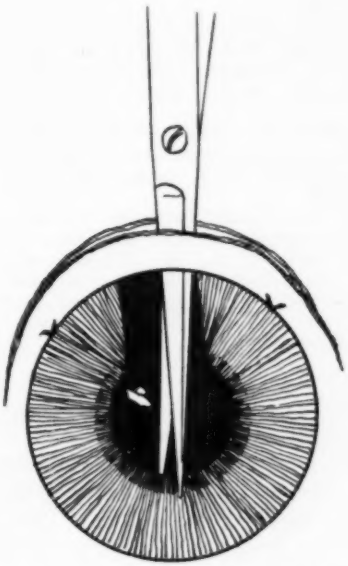

Fig. 4 (Smith). Position of Knapp iris scissors during sphincterotomy.

the operation has been described. If the sphincter is cut, it is not necessary to continue the incision further into the iris. As the points of the scissors approach the iris borders, the iris tends to recede from the blades. If this happens, the points must be pushed farther in, one in the anterior chamber and one in the posterior chamber, and the sphincter cut.

The closed blades of the scissors should be introduced into the wound parallel to the plane of the iris, tilted only slightly by rotation about their long axis, then opened to engage the pupillary border of the iris and then closed to make the cut in the sphincter. If the scissors were inserted and opened at right angles to the plane of the iris, there would be a tendency to cause more gaping of the wound, or to pull out the sutures if they had been tied, hence perhaps cause more loss of vitreous.

No hemorrhage followed this procedure in any of the six cases.

The procedure may also be useful in the linear extraction of congenital cataract. Huerkamp[10] says that one third of all eyes in which cataract extraction has been done for congenital cataract have updrawn pupils. The procedure should, therefore, always be kept in mind when operating for congenital cataract, either to be done at the time of operation if necessary, or as a secondary operation.

The sphincterotomy, as described, is a simple procedure which may be done before or after extraction of the lens. It tends to make a second operation unnecessary provided no complications occur except loss of vitreous.

It has probably been done by other ophthalmologists in this country, but it is not so widely known as it deserves to be and is now presented as a part of the surgical armamentarium to those ophthalmic operators who occasionally are unfortunate enough to lose vitreous.

450 Sutter Building (8).

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Ophthalmic Miniature

Hussy, Stella, you jest about poor Congreve's eyes; you do so, hussy, but I'll bang your bones, faith.

Swift, *Journal to Stella,* December 14, 1710.

A LONG TERM FOLLOW-UP ON MALIGNANT MELANOMAS OF THE CHOROID BASED ON THE TERRY AND JOHNS SERIES*

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In 1935, Terry and Johns[1] reported a series of 94 cases of malignant melanomas of the choroid. The authors first classified the tumors according to the accepted cell type proposed by Callender[2] in 1931, who found spindle-cell subtype A the least malignant. The malignancy increases in the order listed: spindle-cell subtype A, spindle-cell subtype B, fascicular mixed, and epithelioid. While Callender and Wilder,[3] in 1935, using silver stains proved that the malignancy decreased as the reticulum fibers increased, Terry and Johns were unable to use this test on their series as many of the older blocks had accidentally dried out.

Terry and Johns[1] pointed out that in 44.6 percent of the cases the presence of a tumor was not even suspected clinically. Of the original 94 cases reported, those followed less than five years with no metastases were not included in estimating the percentage of metastases in each cell type.

This reduced the number of cases to 65 of which 28 or 43.1 percent metastasized. Of the 28 cases with metastases 20 or 71.4 percent had metastasized in five years. By the end of nine years this was increased to 25 casse or 89.3 percent.

Terry and Johns[1] felt very strongly that a five-year period was not long enough to be presumptive evidence of a cure in cases of malignant melanomas. Some years before his untimely death, Terry suggested that a long-term follow-up be undertaken to determine where possible the ultimate outcome of the patients in this series, which might reveal some interesting facts about the ultimate behavior of tumors of low malignancy: spindle A and spindle B.

In like manner, of the patients with more malignant types if they survived a 10-year period, what were their chances of a tumor death?

As the study was undertaken, three problems soon became evident:

The first was the fact that several of these patients had been operated upon around 1900, some 50 years before. Some patients had died in hospitals no longer existent and whose records had been destroyed.

The second problem was that many of the eyes had been removed elsewhere and sent in. Some of these had no records or names. The three cases which were not traceable fell into this group.

The third problem was the laxity as to an accurate medical diagnosis where the physician signed the death certificate as "cancer" for any malignancy. No effort was made to determine whether the tumor was a carcinoma or sarcoma. This remained an ever-present enigma and as such will be discussed in detail later. It has very probably lowered the true melanomas mortality rate in this series. These cases are classified as "other tumors." There were seven such cases in the series.

SPINDLE A (table 1)

In 1939 Wilder and Callender[4] reported that no deaths had occurred from any spindle-cell A tumors. However, in 1941 Callender, Wilder, and Ash[5] reporting on "Five hundred cases of malignant melanomas of the choroid and ciliary body followed five years or longer" found that two deaths had occurred in the 35 cases of spindle A in their series.

Two of the 14 patients with spindle A

* From the Eye Pathology Laboratory of the Massachusetts Eye and Ear Infirmary and Harvard Medical School. Candidate's thesis for Master of Medical Science in ophthalmology accepted March 26, 1952, by the University of Pennsylvania.

Fig. 1 (Chisholm). Break through sclera with an epibulbar nodule. (×90.)

previously reported by Terry and Johns[1] have now died from metastasis. The microscopic sections of these two cases were carefully reëxamined for a possible error in classification. They were both spindle-A type. This was confirmed by Dr. Parker Heath.

Actually, the entire group of 14 cases of spindle-A type was studied very carefully. As a result of this, it was felt that five of the original 14 tumors were not pure spindle A. Two were predominantly spindle B and were so reclassified in the spindle-B group, although one patient died 26 years later of metastasis and the other, 25 years later from "cancer of the stomach."

TABLE 1

SPINDLE-A TUMORS, NINE CASES

	Number	Average Years Followed	Tumor Deaths (percent)	Cures (percent)
Known metastases	2	10.5	22.2	
"Other tumors"	2	12	22.2	
Cures 11–15 yr.	1	23.8		55.5
26–30 yr.	4			
	5			

The three other tumors contained areas of epithelioid cells. They were reclassified as mixed tumors and included in that group. Unfortunately, this often had to be decided from studying one, or at most two, slides. I suspect that it is the rare tumor that shows the same cell type at different levels.

The relative low malignancy of spindle-A tumors is confirmed by the fact that the two patients with known metastases averaged 10.5 years alive after enucleation. Of the five accepted as cures, four lived over 20 years. This group averaged 23.8 years alive.

One of these, K. K., Case 4, is of special interest. The patient, a man, was aged 35 years at the time of enucleation in 1920. The pathologic report showed that the tumor had broken through the sclera.

A local removal of orbital tissue was subsequently done, followed by X-ray treatment. The orbital tissue removed was found to contain malignant melanoma. When last heard from in April, 1951, he was in excellent health and weighed more than he ever had. On last examination in 1948, he was wearing a prosthesis. His socket was clean and contained no palpable masses. His liver edge could not be felt. This case was reported by Verhoeff[6] in October, 1943.

The cause of death in the two patients listed as "other tumors" may well have been due to metastasis from the original melanoma.

Case 11 was that of a patient who also had a hypernephroma. The patient died eight years after enucleation. The immediate cause of death was bronchopneumonia. "Contributing cause was hypernephroma of the right kidney with metastasis to liver, lungs, and skin"—Bureau of Vital Statistics, State of New York.

The red herring is the skin metastasis. Both hypernephroma and malignant melanoma metastasize to the liver and lungs. Melanoma may metastasize to the skin but hyperne-

phromas rarely do. Willis[7] mentions the possibility, while other authorities such as MacCallum,[8] Ewing,[9] Karsner,[10] and Anderson[11] do not.

Unfortunately, the physician who signed the death certificate on this patient in 1936 no longer has the record. No postmortem examination was done. No additional information is available. While this is a case of multiple tumors, the tumor causing the patient's death is unknown.

In Case 12 the eye was enucleated in 1899. The patient died 14 years later of "exhaustion of the heart from cancerous obstruction of the small bowel"—State House records. His physician is dead and the hospital is now nonexistent.

Spindle B (table 2)

The relative low malignancy of the spindle-cell type B malignant melanomas is confirmed by the 11 cases of known metastases averaging 10.5 years alive after enucleation.

Three cases showing late metastases are reported briefly:

1. In Case 17, J. P., the patient was aged 38 years at the time of enucleation. There was a wide scleral perforation. Several follow-ups were normal. In March, 1942, 23 years later, on admission to the Massachusetts General Hospital, she was found to have a generalized sarcomatosis of the stomach, pelvis, spine, and femur. This was confirmed by X-ray films and biopsy from the femur. Yet when she died in August, 1942, after about two months in a nursing home, the death certificate in the State House read: "Generalized carcinomatosis, primary in the stomach."

2. In Case 15, the patient was aged 30 years at the time of her enucleation. Nineteen years later she died with metastasis to the liver.

3. In Case 24,, the patient was aged 57 years at the time of her enucleation. The last communication from her in November, 1941, stated that she was in excellent health. However, she died in April, 1944, aged 76 years, of generalized melanosarcomatosis, 19 years after enucleation.

Case 19 was originally listed in the "other tumor" group. Some four and a half years after enucleation, the patient died at the age of 68 years of "hypostatic pneumonia and cancer of the left ovary with metastases to liver, heart, kidneys, and lymph nodes." This was one of the few cases in which a postmortem examination had been made. Specimens obtained from the liver and the heart proved to be metastasis of malignant melanoma, not carcinoma. A review of the protocol revealed no evidence of primary ovarian malignancy. An enlarged ovary was described. However, no sections were made from it.

The three cases listed as "other tumors" arouse considerable speculative interest:

1. In Case 20, the patient died six years after enucleation, at the age of 77 years, of "cancer of the stomach, liver, and bile ducts"—State House records.

2. In Case 27, the patient died six years after enucleation from "carcinomatosis—cancer primary in the large intestine"—Rhode Island State Department of Health. The physician handling the case was contacted. He admitted that no surgery had been done as the patient was in extremis. There were large masses in the abdominal cavity. The patient had a history of ruptured ulcer,

TABLE 2

Spindle-B tumors, 26 cases

	Number	Average Years Followed	Tumor Deaths (percent)	Cures (percent)
Known metastasis	11	10.5	42.3	
"Other tumors"	3	12.3	11.5	
Cures 6–10 yr.	1			
11–15 yr.	1			
16–20 yr.	3	17.9		30.8
21–25 yr.	2			
26–30 yr.	1			
	8			
Cause of death unknown	2			
No clinical records	2			

surgically treated. The physician felt no reason to question the accuracy of his diagnosis!

3. In Case 13 the tumor was originally listed by Terry and Johns[1] as spindle A. The only slide that could be found is stained with phosphotungstic acid hematoxylin. This makes necessary the reclassification as spindle B. This eye was enucleated when the patient was aged 36 years. Twenty-five years later, in 1927, he died in an alms house from "cancer of the stomach"—State House records. No records were kept at the alms house and his physician is dead.

Fascicular (table 3)

Case 39, A. M. McQ., is a most unusual one. When the patient was aged 23 years, her left eye was removed for a malignant melanoma. The pathologic report stated that the tumor had perforated the sclera but that the orbit was not involved. Thirty-six later, in 1944, metastases had occurred in one kidney and its neighboring lymph nodes. Three years later, a lymph node from the left lower anterior axillary chain was also found to contain a metastasis.

Late in December, 1948, a metastasis to the skin over a scapula was removed. X-ray films of the chest at this time were negative. In April, 1950, a hospital survey with barium enema and chest plates was also negative. This case will probably be reported in detail later by Dr. Knowles B. Lawrence.

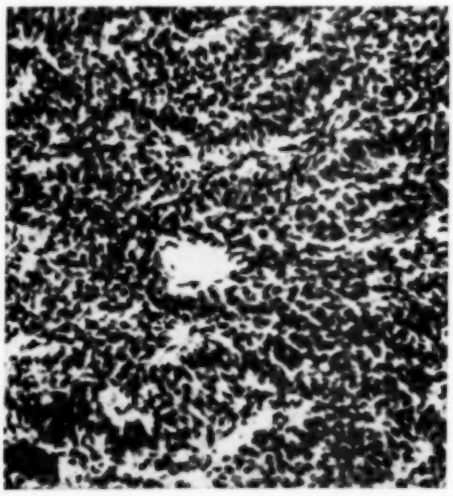

Fig. 2 (Chisholm). Fascicular area. (×135.)

The time interval for the first delayed metastasis in this case exceeds by six years that in Pawel's[12] case reported in 1900, and that in Hall's[13] case reported in 1950 of a metastasis occurring after 30 years. Lehrfeld,[14] in a letter to the editors, pointed out several rather striking weaknesses in Hall's[13] case. He felt that there was considerable doubt that this was an authentic case of a metastasis occurring 30 years later.

Willis[15] erroneously gave W. H. Wilder[16] credit for reporting a tumor that had metastasized after 32 years. He referred to a report by Wilbur and Hartman[17] who had accepted Shroeder's[18] report. W. H. Wilder[16] never reported the case but stated in 1900 before the Chicago Ophthalmological and Otological Society, in a discussion of long-delayed metastasis, that he had seen the liver in such a case several years before in the pathologic laboratory of Professor Kundrath in Vienna.

In Case 39, the patient has the longest known time interval on record for a long-delayed metastasis. In this small series of fascicular tumors it raised from four to eight and one-half years the average of the years alive before subsequent tumor deaths for the other six cases. This erroneously makes it appear that the fascicular group is not very malignant.

The two slides of this case remaining in the

TABLE 3

Fascicular tumors, nine cases

	Number	Average Years Followed	Deaths (percent)
Known metastasis	7	4 or 8.5??	66.6 or 77.7??
Death other cause	1		
Lost after four years	1		

collection were studied. The tumor is fascicular in one area but predominantly epithelioid elsewhere. It also shows a wide break through the sclera adjoining the optic nerve, not shown in the photograph.

The block is missing so that a Wilder silver reticulum stain could not be done. The tumor probably should be reclassified as a mixed tumor.

Epithelioid (table 4)

The high malignancy of the group is confirmed by death occurring on an average of four years postoperatively.

It is most unfortunate that in this small group three cases had such incomplete follow-up records as to require listing as unknowns.

The high malignancy of this type of tumor is confirmed by the average short span of life of those dying from metastases—three and one-half years.

Case 76 is of interest. J. G. was aged 53 years at the time of enucleation. The pathologic report showed a perforation of the sclera and invasion of the orbit. In spite of this she lived 28 years longer, dying of apoplexy at the age of 81 years.

Of the two cases listed as "other tumors," the first is the second known example of multiple malignancies occurring in this series.

Case 67, E. P., a woman, was aged 66 years at the time of her enucleation. Nine years later she was admitted to the Lowell General Hospital with a diagnosis of hypertensive heart disease and carcinoma of the right breast. Physical examination revealed

TABLE 4

Epithelioid tumors, 12 cases

	Number	Average Years Followed	Deaths (per-cent)	Cures (per-cent)
Known metastasis	5	4	41.8	
Cures	3	14.6		25
? Cure	1	2	(died of pneumonia)	
Unknown	2	5.5	(followed 4–8 yrs.)	
No clinical records	1			

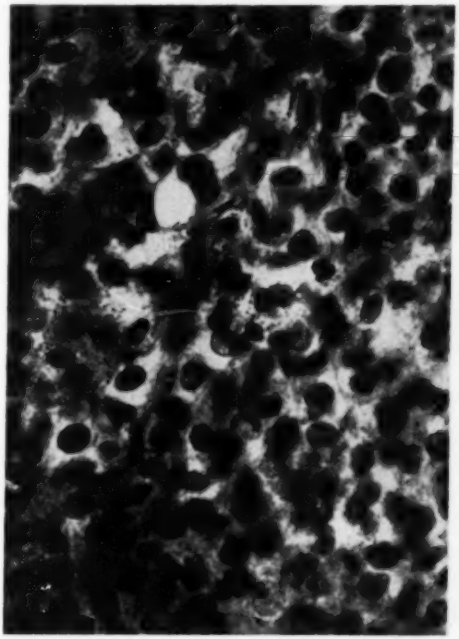

Fig. 3 (Chisholm). Epithelioid area. (×450.)

"an ulcerative area on the right breast." She died three days later, no biopsy or operation having been performed.

Case 2, L. G., a woman, aged 36 years at the time of enucleation, died eight years later of "cancer of the first portion of the duodenum"—State House records. An operation preceded her death. No biopsy or postmortem

TABLE 5

Mixed tumors, 28 cases

(Spindle type undetermined—epithelioid)

	Number	Average Years Followed	Deaths (per-cent)	Cures (per-cent)
Known metastasis	19	3.5	50.0	
Other tumors	2	8.5	5.2	
Cures 0– 5 yr.	2			
6–10 yr.	1			
11–15 yr.	6	16		39.4
21–25 yr.	3			
26–30 yr.	3			
	15			
No clinical records	2			

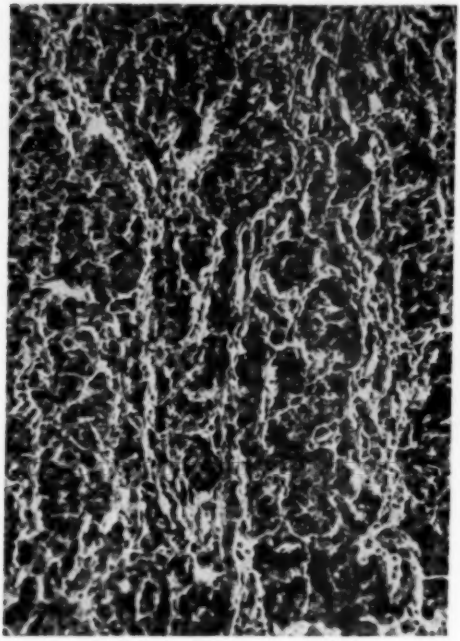

Fig. 4 (Chisholm). Metastasis to kidney after 36 years. (×135.)

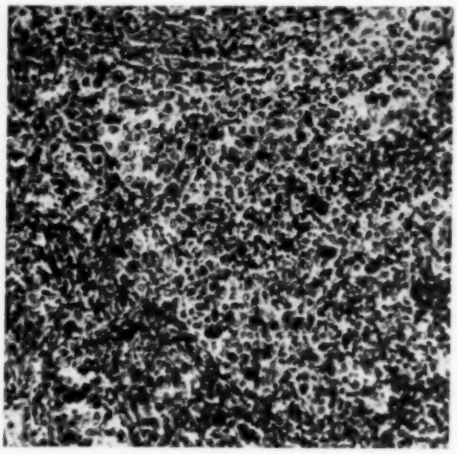

Fig. 5 (Chisholm). Metastasis to neighboring lymph node. (×135.)

TABLE 7

DISTRIBUTION OF METASTASES

Liver	20	Orbit	3 (recurrence?)
Lymph nodes	5 (2 regional)	Brain	1
Lungs	3	Spinal Cord	1
Pleura	1	Spine	3
Stomach	3	Pelvis	2
Heart	2	Femur	1
Kidneys	1	Ribs	1
Pancreas	1	Generalized	3
Adrenals	1	Location not specified	6

examination was done. This case was originally classified by Terry and Johns[1] as a spindle-A tumor. On reëxamining the one slide, it was felt that the tumor was spindle B with an area of epithelioid so the tumor was changed to the mixed group.

While Table 7 adds little to what is already known about the distribution of metastases of malignant melanoma, it does stress a few points that are perhaps not to generally recognized:

First, the lymph nodes are involved more than is generally believed; five cases in this

TABLE 6

CELLULAR CLASSIFICATION AND END RESULTS

	1935		1951		"Other Tumors" Metastases (percent)
	Number of Cases	Metastases (percent)	Number of Cases	Metastases (percent)	
Spindle A	6	0	9	2–22.2	2–22.2
Spindle B	12	5–41.5	26	11–42.3	3–11.5
Fascicular	8	5–62.5†	9	7–66.6 or 77.7	
Epithelioid	8	3–37.5	12	5–41.8	
Mixed	31	16–51.0	38	19–50.0	2– 5.2
	65*	29–48.3†	94	44–44.5	7–12.9

* Cases followed less than five years with no metastases not included in this table. (Terry and Johns.)
† Error in original table: five of eight cases was listed as 41.5 percent.

series, or 11.8 percent of the known metastases. Second, the metastases are often widespread. If more postmortem examinations were made this would become obvious. Lastly, it stresses again that the liver is by long odds the most likely place for metastasis; 20 cases or 46.5 percent.

How significant is the patient's age?

Figure 10 shows that there is approximately a 50-percent death rate from metastasis in each age group.

In this small series it would appear that the degree of the malignancy is not appreciably affected by the age of the patient. In other words, the general statement "that the younger the patient, the more malignant the tumor" does not apparently apply to malignant melanomas of the choroid.

The almost equal malignancy in all age groups shown in this series does not agree with the findings of Callender, Wilder, and Ash,[5] Martin-Jones, [19] and B. Benjamin and others[20] who find a worse prognosis in the older age groups.

On the other hand, if later work confirms these findings, it does not mean that a tumor being discovered can safely be left for a number of years without additional danger to the patient. The sooner the eye is removed, the better, for this would remove the source of metastasis.

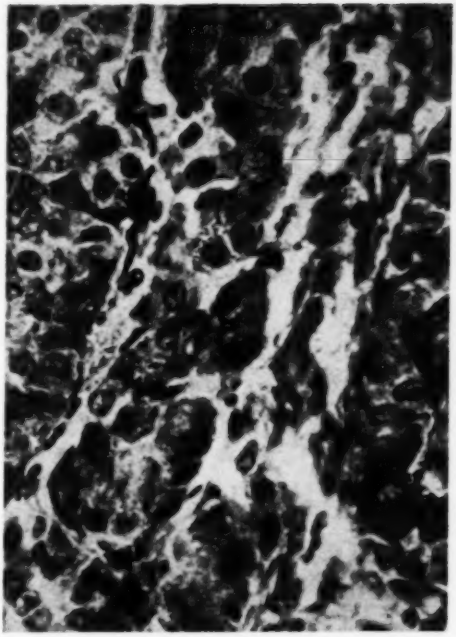

Fig. 6 (Chisholm). High-power view of kidney tissue. (×450.)

It must not be forgotten that each tumor is an individual problem. A few small tumors have metastasized early, and a few large ones have not. Tumors have perforated the sclera and not metastasized—others apparently have not perforated and have metastasized. The

TABLE 8

Tumor mortality expectancy

Post-operative Year	Number of Cases	Number Tumor Deaths	Tumor Deaths (percent)	"Other Tumor" Deaths	"Other Tumor" Deaths (percent)	Probable Correct Tumor Deaths (percent)	Other Deaths
0– 5	91*	26	28.7	2	2	30.7†	6
6–10	57	5	8.7	3	5.3	14.0	3
11–15	46	5	10.9	1	2.1	13.6	5
16–20	35	2	5.7	—	—	5.7	4
21–25	29	1	3.4	1	3.4	6.8	2
26–30	25	1	4.0	—	—	4.0	2
30–35	22	—	—	—	—	0	—
36–40	22	1	4.5	—	—	4.5	—
Unknown	21	2	9.5	—	—	—	—

In the above table the first five years show 28.7 percent mortality. This decreases considerably in the next 10 years to approximately 10 percent and drops sharply again from 16 years on to 4.3 percent.

* Three cases discarded—no data.

† Correct to 2.2 percent since two cases had known multiple malignancies.

Fig. 7 (Chisholm). Lymph node. (×450.)

relationship of cell type to malignancy is known and has already been discussed, as has the reticulum content briefly.

In addition, a flat melanoma covering a large number of emissary vessels and nerves is more apt to perforate the globe than one with a small base. For example, the regions of the ciliary body and that surrounding the optic nerve are particularly vulnerable from the large number of emissary vessels and nerves located there. There are probably many other factors yet unknown which future study will clarify.

Cause of death "cancer"?

It became obvious early in the study that greater care was needed in making accurate medical diagnoses of the cause of death. The term "cancer," as found in the State House records, appears to have been used by the physicians signing the death certificate as a catch-all for any malignancy. The result has been that seven patients in the series died from "cancer." However, there is no way of telling whether it was a carcinoma or a malignant melanoma. These are reported as "other tumors."

That a patient with a malignant melanoma of the choroid may also have a proven carcinoma is an accepted fact; but it is quite rare. Duke-Elder[21] gave reference to only five cases.

Warren and Gates,[22] in a splendid review article in 1932, collected 1,219 cases and added 40 more of their own. They found an incidence of 1.84 percent of multiple malignancies, largely carcinomas, on the basis of collected statistics, and 3.9 percent on the basis of American statistics alone.

Hurt and Broders[23] found 3.4 percent at the Mayo Clinic in 1929. While Warren and Gates missed the five cases listed by Duke-Elder,[21] they did find one additional case reported by Hutchinson,[24] in 1892, of a melanotic sarcoma of the choroid and cancer of the uterus.

In 1943, Ashbury and Vail[25] reported the case of a 26-year-old man who had an eye removed for a malignant melanoma of the choroid. This was followed in four years by an incomplete removal of a glioblastoma multiforme from which he later died.

TABLE 9

Survival Rate

		Number of Cases	5 Year (percent)	10 Year (percent)
B. Benjamin et al.[20]	1948	250	80.7	73.4
Terry and Johns Series	1951	91	69.3	55.4
Martin-Jones[19]	1946	238	64.2	44.5
Callender, Wilder, and Ash[8]	1942	1418	52.0	34.0

Dunphy[28] had a woman patient, aged 56 years, who, in 1938, had a resection of the colon for adenocarcinoma; in 1942, her right breast was found to contain a carcinoma simplex; in 1946, her enucleated eye contained a malignant melanoma of the choroid.

A second patient under his care had an eye removed elsewhere for a proven malignant melanoma. Eleven years later, a hysterectomy revealed an adenocarcinoma, grade two. These cases will probably be reported in detail later.

An incomplete examination of some of the records of the pathology laboratory revealed two cases of multiple tumors. In 1930, H. B., aged 30 years, had one breast removed for benign tumor and the other, in 1935, for a papillary cyst adenoma. In 1944, an iridectomy confirmed the presence of a malignant melanoma of the iris and, in 1949, a biopsy of a skin lesion on her face was reported to be basal-cell carcinoma.

A third case was found in the pathology laboratory files: A man, aged 25 years, had an eye removed in August, 1914, for a proven melanotic sarcoma of the choroid. In December, 1938, a diagnosis was made of melanotic sarcoma of the choroid in the remaining eye. All treatment was refused. In December, 1945, he was seen privately in Providence, Rhode Island, with vision much reduced. The same diagnosis was made, and again treatment was refused. This case will be reported in detail later.

It, therefore, becomes quite evident that it is highly unlikely that, in seven patients in this small series of 94 malignant melanomas, the cause of death was primary carcinomas. Two of the patients definitely had multiple primary tumors. These seven listed as "other tumors" have been briefly discussed.

A LESSON LEARNED FROM ATTEMPTING A FOLLOW-UP IN THIS SERIES

Until one has had the experience of attempting a follow-up on a series of cases such as this, the woeful inadequacy of his own and most physicians' records of their tumor cases does not become apparent. In many cases the hospital records are worse or not a great deal better. This failure apparently results from two factors:

1. The tendency and desire of the patient to dismiss and forget, as a horrible night-

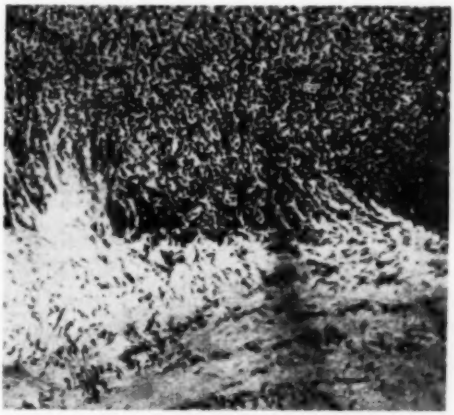

Fig. 8 (Chisholm). Epithelioid cells invading sclera extensively.

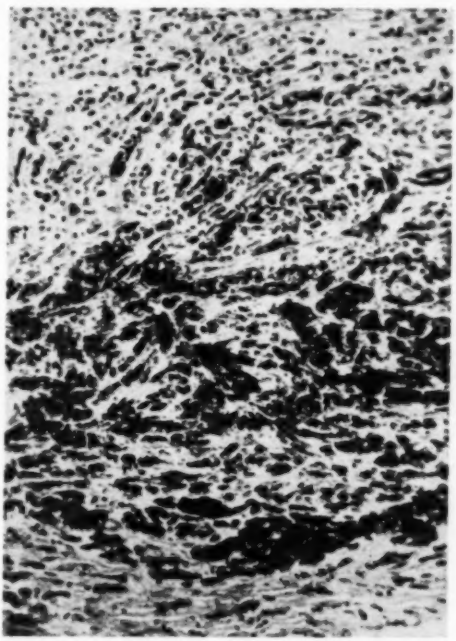

Fig. 9 (Chisholm). Lymph node from another area. (×135.)

mare, the terrifying experience of having had a malignant tumor removed.

2. The physician's half-hearted attempt to have the patient return for checkup.

While the second reason is partially influenced by the first, it is also influenced by the grim realization that should a metastasis occur there is so little to offer.

I feel and would like to urge very strongly that each physician make a real effort to follow-up his cases of malignancy. I believe that this can be done very simply in the following manner:

Each physician should turn over the patient's name to his secretary with instructions that the patient return for a checkup at stated intervals. For the average ophthalmologist there would rarely be over a half a dozen to a dozen patients followed during a given interval. For the few prominent men with a large referral practice this would be more of a problem. However, since most of these cases are referred back to their physicians, a yearly note to the referring physician would bring the desired information.

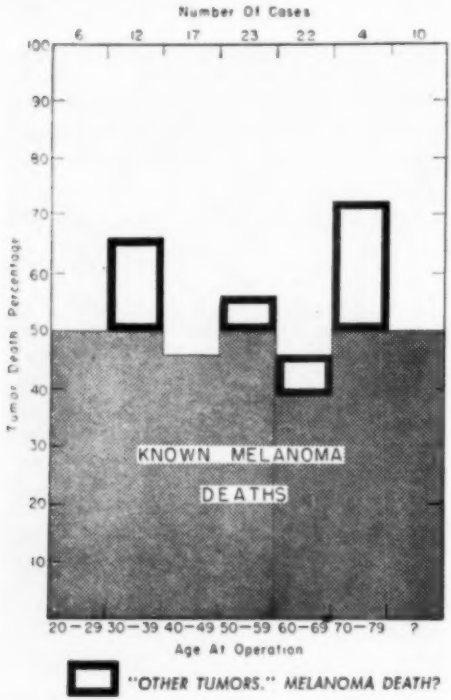

Fig. 10 (Chisholm). Chart showing percentage of deaths due to melanoma in different age groups.

This simple program just outlined would pay big dividends. First, the nervous patient would appreciate the personal interest and be reassured by the visit. Secondly, the ignorant or indifferent patient would be kept under observation. Lastly, adequate data would then be available on a large number of cases so that the tumor behavior patterns could be followed.

It is most unfortunate that today, while medical science is progressing rapidly, we are not keeping abreast via our follow-ups. Valuable time is passing. Thousands of tumor cases are already unavailable for study. Unless a radical change in physicians' follow-ups takes place, the end of this century will find little change in the knowledge available from this valuable source.

It is possible that while millions of dollars are now being spent on cancer research, part of the answer could be found in data obtained from careful systematic follow-ups of thousands of cases. This is what the Army Medical Museum in Washington is trying to do today. Even their series are badly handicapped by inadequate data!

What constitutes a cure?

There has been a definite tendency for some years to require a longer period of time for an accepted cure. In the earlier reports in the literature, a three-year cure was for a while accepted; then a five-year one. Terry and Johns[1] felt that the "usual five-year cure" was not enough.

Were it not for the fact that the incidence of malignant melanomas of the choroid rises sharply after the age of 40 years, the percentage of tumor deaths would probably be much greater than it is. Now, through the newer drugs, antibiotics, and improvements in medical science the life expectancy has risen greatly. Nevertheless, as a person ages, he leaves a period in which accidental deaths were high and enters into one in which the

"natural" causes of death begin greatly to increase.

It, therefore, becomes fairly obvious that the older a person is when a melanoma is discovered, the more his life expectancy becomes a race between a tumor death and the "natural" causes. If it is an early case—that is, the tumor has not already metastasized (and I should like to point out that I feel very strongly that each person should have a thorough survey, with X-ray studies and so forth before the enucleation is done) the race may go either way. A lot, of course, depends on the cell type of the tumor and its reticulum content.

It seems very apparent that even in a study like this the figures are, at most, very inadequate and the real incidence found is too low. Think of the number of deaths from "natural" causes in elderly people who unquestionably have many early metastases, about which we never learn! Our six known cases of long-delayed metastasis show this possibility all too clearly.

There are some investigators who feel that these so-called "long delayed metastases" may be new tumors. Since there were several cases that filled this category in this series, attempts were made to study the biopsy when possible. Only two such specimens were available. These were obviously metastases and had already been so diagnosed by the pathologist examining the slides.

Scleral perforation—its significance?

There is, as yet, no explanation of why one small tumor which has not apparently perforated the globe will metastasize, while another that has perforated, does not. However, scleral perforation does not have 100-percent fatal consequence.

Terry always taught that the orbit was not a fertile field for malginant melanoma cells. Nor do I feel that an exenteration should be done because of perforation. This is a frightfully shocking, as well as disfiguring operation, for any person to undergo. Especially is this true if the person is elderly.

This view does not agree with that of Iliff,[27] who feels that scleral perforation per se calls for exenteration.

Chandler[28] feels that exenteration in the elderly is not indicated. At the present time, he has two patients over the age of 80 years with small malignant melanomas. These were picked up by routine examination and are in eyes with considerable vision. Until complications, such as secondary glaucoma or evidence of definite growth, occur, he feels that, with life expectancy so limited, even an enucleation is not indicated.

In Case 4, spindle-A type, an extensive perforation occurred in a 35-year-oid man. A local removal of anterior orbital contents was done, followed by X-ray therapy in 1920. He is alive and well 31 years later.

Case 76, mixed type, had a perforation of the sclera and invasion of the orbit; yet this woman lived 28 years to die of apoplexy at the age of 81 years.

In the third case, Case 39, a fascicular-type tumor had perforated the sclera. Though the orbit was not apparently involved, 36 years later the first metastasis developed; in the 39th year, the second; and in the 41st year, the third. In a recent complete physical examination, with X-ray studies and so forth; all tests show her to be healthy today.

Summary

Two spindle-A tumors metastasized.

The patients having spindle-A and spindle-B tumors averaged 10.5 years alive before dying from metastases. The fascicular, epithelioid, and mixed tumors were roughly three times more malignant—death from metastases occurring on an average of 3.8 years.

The distribution of metastases from malignant melanomas was found to be more widespread than originally reported by Terry and Johns.[1] Of especial interest was the fact that, in five patients, metastases were found in lymph nodes. In two of these, regional nodes were involved which is very unusual. One patient developed metastases in two different groups of nodes.

The age of the patient apparently made no

difference to life expectancy. While the youngest patients in the group were in the third decade, each age group averaged approximately 50 percent of deaths from metastases.

The metastatic behavior of malignant melanomas is still a mystery. Of the known metastases, 26 or 28.5 percent, occurred in five years; 31, or 34 percent, in 10 years; and 36, or 39.6 percent, in 15 years. Metastases continued to occur at any time interval. Of 11 patients developing metastases years later, six of these were long-delayed metastases as follows:

Number of cases	Years before metastases
2	19
1	23
1	26
1	29
1	36

The inaccuracy of medical diagnosis as to the cause of death was discussed. While it is unusual for a malignant melanoma and a carcinoma to occur in the same person, the diagnosis of "cancer" as a cause of death was frequently used.

Two cases of accepted multiple malignancies were found in the series. However, five cases having "cancer" deaths which could neither be proved nor disproved were also listed as "other tumors." A more accurate percentage of metastatic deaths would probably be obtained if both of these groups were included with the known metastases.

While there is no question that the presence of a scleral perforation increases the chances for a metastasis, it is not necessarily 100-percent fatal. Three cases in which this occurred were followed for an average of 31.6 years. One of these cases developed metastases after 36 years. While three cases have no statistical value, it would certainly seem that, in general, exenteration need not be done on the elderly for scleral perforation.

An attempt was made to determine the tumor mortality expectancy. The first five years is by far the most dangerous period, with a 28-percent mortality rate. In the six- to 15-year period, this fell to 9.9 percent. Beyond that the average fell to 4.3 percent.

34½ Beacon Street (8).

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MULTIPLE MALIGNANT MELANOMAS IN ONE EYE*

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A cursory review of the ophthalmic literature reveals that there have been exceedingly few reported cases of multiple primary malignant melanomas of the choroid.

Fuchs,[1] in a monograph on tumors of the eye written in 1882, mentioned nine cases in which more than one tumor mass was situated in the choroid. A review of these cases demonstrates that in only one instance were acceptable criteria for multiple primary tumors fulfilled, although the data submitted are admittedly brief and incomplete. Three of his cases occurred in young children. One case occurred in an eye harboring a wooden foreign body.

Velhagen,[2] in 1920, reported on two juxtaposed nodular malignant melanomas in a single eye. Although the intervening choroid was believed to be free of tumor, the sclera between the two lesions was found to be infiltrated with tumor cells. The evidence would thus appear to be against this case being one of multiple primary melanomas of the choroid.

Rochat,[3] in 1926, reported on two malignant tumors of the choroid of equal size occurring in one eye in a 40-year-old man. In this case, the second nodule was noted one year after the first observation of a fundus mass. After enucleation, the two lesions were found to be separated by a distance of 11 mm., and the intervening sclera and choroid was found to be normal. Serial sections, however, were not made. The patient was alive and well four years after the first tumor was discovered.

In his recent volume on tumors of the eye Reese[4] states that he knows of no authenticated cases on record of multiple primary malignant neoplasms of the choroid in a single eye.

We have recently had the opportunity to study an enucleated eye which contained multiple separate malignant melanomas of the uveal tract. At least two of the lesions are completely independent, as proven by serial sections. It was therefore felt worthwhile to report this case. We report it through the courtesy of Dr. William C. Owens.

CASE HISTORY

Mr. J. R., a 52-year-old white man, first came to the attention of an ophthalmologist in 1947. He was found at that time to have a lesion in the left eye which the examining physican felt warranted admission to the hospital. This advice was not heeded.

During the ensuing 18 months, the patient gradually lost the central vision in the left eye. Four years later, in September, 1951, the patient first presented himself to Dr. W.

* From the Wilmer Ophthalmological Institute of The Johns Hopkins Hospital and University.

C. Owens, complaining of difficulty in focusing with his right eye. There had been no pain or redness of the left eye.

Examination of the left eye revealed a large mass extending out from the disc to the far temporal periphery. The mass was found to be elevated six diopters and to have steep margins. A few striae were recognized in the retina below. In the extreme temporal periphery a bullous detachment of the retina was noted. The mass barred transillumination. The intraocular pressure was normal.

The patient was admitted to the Wilmer Institute of The Johns Hopkins Hospital. General physical examination, except for the left eye, was completely normal. No evidence was found of other primary tumors, or of metastatic tumors. On September 16, 1951, the left eye was enucleated. At the time of enucleation no extrabulbar extension of the tumor was found.

At the time of this writing the patient is still in excellent health.

Pathology

Gross examination (fig. 1)

The eye is normal in size and shape. There is spiculelike pigmentation of the sclera temporal to the optic disc. There is a large tumor mass, 15 mm. by 17 mm. in size, extending from the region of the macula to the ora serrata. This mass is relatively flat and is grayish in color.

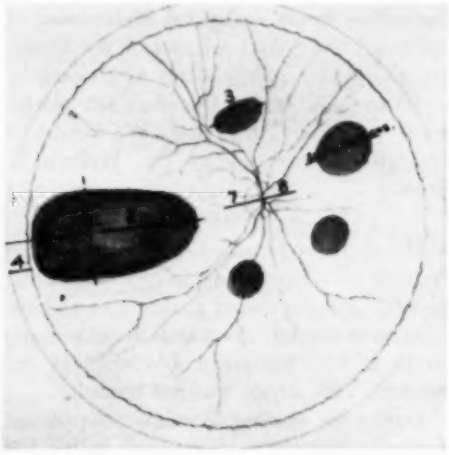

Fig. 1 (Rosen and Moulton). Diagrammatic representation of the gross appearance of the posterior segment of the sectioned globe.

Four smaller flat discrete tumor nodules, varying in diameter from two to eight mm., are seen about the optic nervehead. There is a simple detachment of the retina about the largest tumor.

Microscopic examination

The cornea and iris are normal. The anterior chamber is shallow. One chamber angle is filled with spindle-shaped tumor cells which are continuous with a flat mass involving all portions of the ciliary body on one side. This mass is composed of spindle cells of Callander type A which are largely arranged in parallel bundles. The portion of the tumor in the pars plana is more heavily pigmented than that in the corona ciliaris. There is invasion of the overlying sclera.

Beyond the ciliary-body tumor there is a short span of normal choroid and sclera, after which a large choroidal mass is encountered. This mass is composed of spindle cells of Callander type B, and is only slightly pigmented. There is moderate vascularization of the tumor; there is no necrosis. There is degeneration of the overlying retina and, in one place, the retina is penetrated by the tumor.

Sections made through various portions of the posterior segment of the globe reveal a number of discrete malignant melanomas of the choroid, varying in histologic type. Spindle cell type B predominates; however, epithelioid and mixed cell types are present.

The actual number of lesions cannot be stated inasmuch as serial sections were not made through the whole eye. However, serial sections carried through a portion of the posterior segment which appeared grossly to contain a single moderate-sized tumor of the choroid, reveal two separate and distinct malignant melanomas of the choroid which are in no way connected with any other lesion. Furthermore, a single benign mela-

noma of the choroid is encountered in one of the sections.

There is invasion of the sclera over the individual masses, but no penetration is present. In many places the overlying retina is invaded by tumor. In no instance is intravascular extension of the tumor encountered.

The remaining pathologic findings in the eye are: optic atrophy, papilledema, hyaline body in the optic nerve, cystic degeneration of the retina, simple detachment of the retina, colloid excrescences of Bruch's membrane.

Pathologic diagnosis

Multiple malignant melanomas of the choroid; malignant melanoma of the ciliary body; benign melanoma of the choroid; simple detachment of the retina; hyaline body of the optic nervehead; papilledema; optic atrophy.

Comment

The association between malignant melanomas of the uveal tract and benign melanomas of that tissue is well known. The coexistence in one eye of several malignant melanomas of the uvea, each of which arises as a primary growth, however, appears to be exceedingly rare, as judged by the paucity of reported cases. Multiple malignant lesions are well known in the iris, but here a seeding out of tumor cells onto the iris surface is the postulated mechanism.

The case herein reported would appear to be unique. The eye examined has several malignant melanomas of the choroid, at least two of which are proved by serial sections to be completely independent. The ciliary-body melanoma also appears to be separate from any choroidal lesion.

The exact number of lesions cannot be stated in the absence of serial sections through the whole eye. However, the gross observation of five separate tumors in the choroid, added to the ciliary-body tumor which was not observed grossly, brings the number of lesions to at least six.

Since serial sections through what appeared grossly to be a single lesion revealed two independent lesions, one might surmise that even more separate tumors are present in this eye.

Against the possibility of this case being one of mutiple metastases to the uvea is the fact that none of the lesions are in relationship with or appear to arise from blood vessels. Moreover, the pathologic findings are identical to those of ordinary malignant melanomas of the uveal tract. In addition, the patient presents no evidence of a primary tumor or of metastatic tumors elsewhere in his body.

Summary

A case of multiple primary malignant melanomas of the uveal tract of one eye is reported and a short review of the pertinent literature is presented.

The Johns Hopkins Hospital (5).

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PROLONGED OCCLUSION*

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The prolonged occlusion test was introduced by Marlow† in 1924 and, since then, it has been called Marlow occlusion to differentiate its use from that of occlusion of the good eye, which is used for the treatment of amblyopia ex anopsia.

Marlow stated: "The prolonged occlusion test is the screen test extended in point of time. The test should last until stability in the position of rest is attained, that is, until the findings are the same from day to day; but as a rule a week's occlusion will furnish valuable information."

He continues:

"Let us consider the effect of an insufficiency of the right superior rectus upon binocular function, and the effect of occlusion in analyzing it.

"1. The right superior rectus being insufficient requires excessive innervation to hold the right eye on a level with the left eye in movements up and to the right.

"2. This excessive innervation is also communicated to its associate in upward movement to the right, the left inferior oblique.

"3. Diplopia due to overaction of the left inferior oblique would result if its direct antagonist the left superior oblique did not counteract the tendency.

"4. The excessive innervation of the left superior oblique necessary for this purpose would be communicated to its associate in movement down to the right, the right inferior rectus.

"5. Diplopia would result if action of the right inferior rectus were not held in check by its direct antagonist, the right superior rectus, thus putting an extra demand on the insufficient muscle.

" 'Binocular single vision' is maintained so constantly in such cases, that, no doubt, spasm of the extrinsic muscles analogous to accommodative spasm in hypermetropia is induced, which obscures the deviating tendencies as effectively as the latter renders hypermetropia latent, and the total result of the activities described as revealed by the ordinary short test may even reveal no imbalance (except a phoria).

"If now the right eye be occluded, binocular vision is made impossible and consequently there will be no effort to maintain it, excessive innervation of the right superior rectus will cease and consequently will not spread to its associate in upward movements to the right to be counterbalanced as described. In fact, all abnormal innervation and all attempts at binocular single vision will cease, and the eyes will gradually assume their relative or anatomical position of rest."

Duane in the seventh edition of Fuchs's textbook expressed the opinion that such "prolonged occlusion tends to make the eyes revert to their infantile state in which not being controlled by coördinative influence, they exhibit a varying imbalance."

Evidently, Duane could not accept at this time the variable application of his screen test, which he found so valuable, but Dr. White and many others did use prolonged occlusion and found it of great value in the studies and treatment of the phorias of patients with persistent asthenopic symptoms.

Bielschowsky‡ has stated that the relative position of rest was the position the eyes assumed when uninfluenced by any innervation due to the power of fusion. He determined in 289 cases the position of the eyes in which binocular vision had been lost by disease of one eye.

There was practical parallelism in 20 to 25 percent of the patients; divergence of two degrees or more in 60 to 70 percent; diver-

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† Marlow, F. W.: The Relative Position of Rest of the Eyes and the Prolonged Occlusion Test. Philadelphia, Davis, 1924.

‡ Abstracted in: Arch. of Ophth. (Jan.) 1914.

gence with hyperphoria in five to ten percent; and convergence of two degrees or more in 10 percent.

The longer binocular vision had been lost the greater was the percentage of a high degree of strabismus.

Marlow states that, having no drug analogous to the cycloplegics to eliminate innervation of the extrinsic muscles, we must fall back upon physiologic principles, and bring about a minimum innervation by removing all stimulus, namely, by making all efforts at binocular single vision impossible by occluding one eye, and by fully correcting all refractive errors in the working eye, and by allowing sufficient time for the spasm to become relaxed.

He concluded that, if these errors are anatomic and congenital, it is unreasonable to expect that the position of rest can be changed by any amount of exercise, certainly not by that ordinarily prescribed especially when consideration is given to the fact that the nature of the case has compelled constant exercises of the same muscles for the purpose of maintaining single binocular vision from a very early period of life. It seems most probable that a developing phoria is a latent anatomic error undergoing gradual manifestation.

We have used prolonged occlusion routinely in all patients whose asthenopic symptoms could not be satisfactorily analyzed by refraction or treatment according to the findings of the routine tests. In the patients who showed some hyperphoria and who continued to be uncomfortable, or whose convergent or divergent anomalies were not satisfactorily analyzed, prolonged occlusion has been used.

The "hyper," dominant, or even nondominant eye has been covered for 48 hours to a week. At the time the patch is put on, the patient is advised of the difficulties in judging distances, as in climbing stairs, and of the precautions to take. He is also told to do his usual work as far as possible, and to wear the glasses as prescribed. In a few patients the patch was tried on first one eye, then the other when no definite conclusion could be reached after the first 48 hours.

The relief of the asthenopic symptoms after the first 48 hours of wearing the patch are usually so helpful that the patients do not object to wearing the patch after that time. If there is no relief of the symptoms, often we can find no ocular cause for the complaints.

The first examination is made about 48 hours after the patch has been applied in order to check the measurements as well as the manner in which the patch is being worn, and to note any relief of the asthenopic symptoms. Total occlusion must be maintained to bring about satisfactory dissociation. At no time must the two eyes be used together during the diagnostic procedures.

At the end of the week the patch is removed, and the examination is carried out in the field of the questionable muscle imbalance first to get the maximum difference, always keeping the occluded eye under the screen except for the momentary removal to do the test. The screen test is done in eyes-front and the eyes are watched while taking them into the cardinal fields of gaze and while measurements are being carried out. The diagnosis is then made and treatment outlined.

The patients have been told before the treatment that surgery may be necessary, and should be done as soon as a satisfactory diagnosis has been made. If for some reason the surgical treatment cannot be carried out as planned, then the patch is removed. It may be applied again later to recheck, if it is in a young child, or if the patient has any question about the necessity for surgical treatment.

At no time has the prolonged occlusion ever brought out any muscle anomaly in patients with a normal muscle balance, as was pointed out by Bielschowsky in his study of the position of rest. An eye in a patient with a normal muscle balance can be occluded for months, and no strabismus will become evident. It is only in those patients who have a

phoria, which can usually be found in the routine examination, that strabismus becomes evident. In these patients, the findings that can be elicited are not sufficient for an accurate diagnosis so that prolonged occlusion is advised.

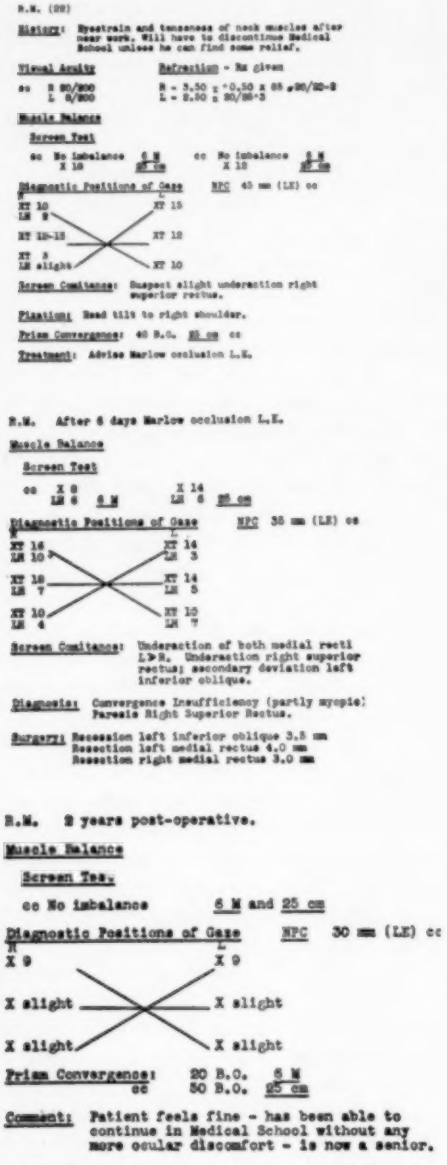
R.M. (22)
History: Eyestrain and tenseness of neck muscles after near work. Will have to discontinue Medical School unless he can find some relief.
Visual Acuity
Refraction - Rx given
Muscle Balance
Screen Test
Diagnostic Positions of Gaze
NPC 40 mm (LE) cc
Screen Comitance: Suspect slight underaction right superior rectus.
Fixation: Head tilt to right shoulder.
Prism Convergence: 40 B.O.
Treatment: Advise Marlow occlusion L.E.
R.M. After 6 days Marlow occlusion L.E.
Muscle Balance
Screen Test
Diagnostic Positions of Gaze
NPC 35 mm (LE) cc
Screen Comitance: Underaction of both medial recti L>R. Underaction right superior rectus; secondary deviation left inferior oblique.
Diagnosis: Convergence Insufficiency (partly myopic) Paresis Right Superior Rectus.
Surgery: Recession left inferior oblique 3.5 mm
Resection left medial rectus 4.0 mm
Resection right medial rectus 3.0 mm
R.M. 2 years post-operative.
Muscle Balance
Screen Test
cc No imbalance 6 M and 25 cm
Diagnostic Positions of Gaze
NPC 30 mm (LE) cc
Prism Convergence: 20 B.O. 6 M
cc 50 B.O. 25 cm
Comment: Patient feels fine - has been able to continue in Medical School without any more ocular discomfort - is now a senior.

Fig. 1 (Cushman and Culver). A case history.

The strabismus that develops in some patients following the occlusion of one eye for an accident or surgery, according to Bielschowsky, indicates that in about 75 to 80 percent of the cases, the patients have a phoria or some ocular muscle anomaly.

We want to report one patient, a boy, aged eight years, with no apparent strabismus, whose right orbit was injured following a bump on a bedpost. The eyelids were swol-

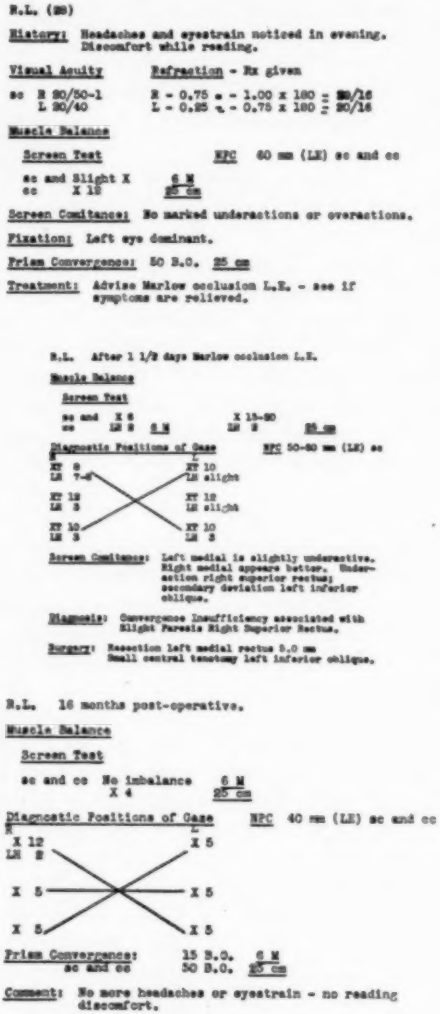
R.L. (8)
History: Headaches and eyestrain noticed in evening. Discomfort while reading.
Visual Acuity
Refraction - Rx given
Muscle Balance
Screen Test
NPC 60 mm (LE) sc and cc
Screen Comitance: No marked underactions or overactions.
Fixation: Left eye dominant.
Prism Convergence: 50 B.O. 25 cm
Treatment: Advise Marlow occlusion L.E. - see if symptoms are relieved.
R.L. After 1 1/2 days Marlow occlusion L.E.
Muscle Balance
Screen Test
Diagnostic Positions of Gaze
NPC 50-60 mm (LE) sc
Screen Comitance: Left medial is slightly underactive. Right medial appears better. Underaction right superior rectus; secondary deviation left inferior oblique.
Diagnosis: Convergence Insufficiency associated with Slight Paresis Right Superior Rectus.
Surgery: Resection left medial rectus 5.0 mm
Small central tenotomy left inferior oblique.
R.L. 16 months post-operative.
Muscle Balance
Screen Test
sc and cc No imbalance 6 M
Diagnostic Positions of Gaze
NPC 40 mm (LE) sc and cc
Prism Convergence: 15 B.O. 6 M
sc and cc 50 B.O. 25 cm
Comment: No more headaches or eyestrain - no reading discomfort.

Fig. 2 (Cushman and Culver). A case history.

len shut for a week. When the swelling disappeared, he had an esotropia and left hypertropia, which did not clear up.

After a year's observation the diagnosis of a secondary deviation of the left inferior oblique, secondary to paresis of the right superior rectus was made, and the inferior oblique was recessed 5.5 mm. Following this, the muscle balance has been within normal limits and the esotropia has disappeared.

Of the 51 patients who were treated with prolonged occlusion for aid in the diagnosis of a motor anomaly in the past two years, 44 were found to have vertical anomalies, and of these 24 required surgery. In only two of the 51 patients no muscle anomaly was found. Ten of the 51 patients were given prisms which were incorporated in their

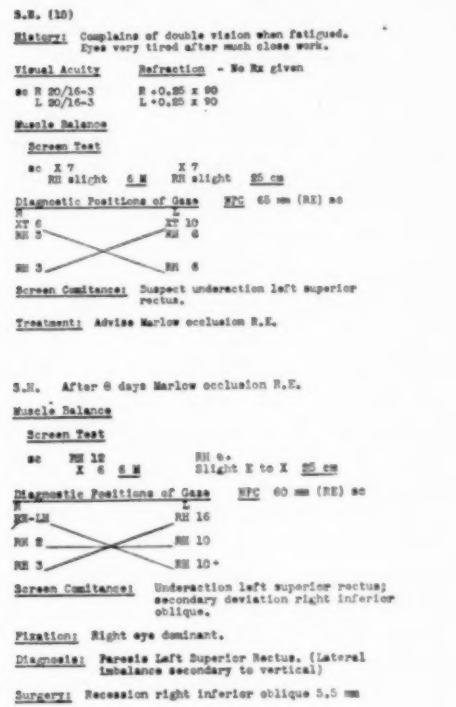

Fig. 3 (Cushman and Culver). A case history.

J.S. (10)
History: Attacks of dizziness off and on past two years. Conjunctiva injected after short periods of reading.
Visual Acuity
Refraction - No Rx given
sc R 20/20
L 20/20
R +1.50- +0.50 x 90
L +1.25- +0.75 x 90
Muscle Balance
Screen Test
Maddox Rod
sc No imbalance
X 50 6 M 25 cm
sc X 1
X 30 6 M 25 cm
NPC 80 mm (LE) sc
Screen Comitance: Slight underaction left medial rectus.
Fixation: Right eye dominant.
Prism Convergence: 50 B.O. 25 cm (forced)
Treatment: Advise Marlow occlusion L.E. to try to uncover more lateral imbalance and a possible vertical imbalance.
Muscle Balance
Screen Test
sc X 12
LH 5 6 M
X 90+
LH 7 25 cm
Diagnostic Positions of Gaze
NPC 150 mm (LE) can be forced to 80 mm
R
L
XT 14
LH 10
XT 16
LH 7
XT 10
LH 4
XT 10
XT 18
XT 10
LH 4
Screen Comitance: Slight underaction left medial rectus. Underaction right superior rectus; secondary deviation left inferior oblique.
Diagnosis: Paresis Right Superior Rectus. Convergence Insufficiency secondary to vertical.
Surgery: Recession left inferior oblique 3.5 mm Resection left medial rectus 5.5 mm.
J.S. Post-operative 8 months.
Muscle Balance
Screen Test
sc Slight X 6 M
X 8-10 25 cm
Diagnostic Positions of Gaze
NPC 50 mm (LE) sc
R
L
X 10
X 6
X 5
X 10
X 6
X 5
Prism Convergence: 14 B.O. 6 M
sc 45 B.O. 25 cm
Comment: Patient is relieved of all symptoms. Normal muscle balance.

Fig. 4 (Cushman and Culver). A case history.

glasses, nine for vertical anomalies and one for a convergence excess with base-out of two diopters in each eye.

Of the 24 surgical patients, there were eight who had a convergence insufficiency associated with a vertical anomaly, and two in whom the convergence insufficiency, we felt, was secondary to the vertical anomaly and did disappear after surgery for the vertical imbalance.

Of 13 patients with divergence excess, nine of whom were operated, in three the strabismus was apparently secondary to the vertical anomalies, and in two secondary to a convergence insufficiency and the vertical anomaly. Eight patients had divergence insufficiency, five associated with vertical anomalies and three with primary divergence insufficiency.

In conclusion we want to emphasize the value of prolonged occlusion in the diagnostic procedures for the patients with continued asthenopic symptoms. Prolonged occlusion never affects or causes an imbalance to develop in a patient who has a normal muscle balance.

Discussion

Kenneth L. Roper (Chicago): There is no doubt that the opportunity to employ monocular occlusion arises more often in large clinics and institutions, but it is also true that no practice lacks that small group of patients with whom all measures have failed to give relief from distressing and persistent symptoms.

In the cases reported by Dr. Cushman and Dr. Culver, monocular occlusion has been employed mainly as a means of uncovering latent heterophoria and, while this is generally the purpose for which it is used, it is well to remember that it is a useful means of determining whether any of the various binocular anomalies are at fault. They mention the relief gained by a number of patients within 48 hours of occlusion. This is very important information to be gained from the test, and should lead one to believe that some binocular difficulty is present; it must then be determined what that binocular difficulty is.

Occlusion studies may sometimes do more than establish the cause of the patient's symptoms; they may point to the advisability of adopting the practice as a therapeutic measure. In 1944 a series of 80 cases was reported in which monocular occlusion was employed (Roper, K. L., and Bannon, R. E.: Diagnostic value of monocular occlusion. Arch. Ophth., **31**:316-320 (Apr.) 1944).

Of this group, 56 obtained partial or complete relief from their chief symptoms during occlusion; 19 reported no relief or that the condition was worse. Of the 80 patients, 49 were found to have a significant aniseikonia, while nine manifested a significant heterophoria following occlusion; 20 had both aniseikonic and motor anomalies. The reason for the high number of aniseikonic cases and a relatively low number of motility cases is explained by the fact that the patients studied had been referred to the Dartmouth Eye Institute primarily because aniseikonia was suspected and motility factors had been pretty well ruled out.

The authors have pointed out that total occlusion is of importance and must be maintained in order to bring about satisfactory dissociation. This point should be stressed. It is a mistake to conclude that when we use occlusion all that is necessary is to prevent binocular fixation of the object of attention. That is only partial occlusion. Reliable and consistent results are obtained only by complete occlusion of one eye. It is important to occlude both the central and the peripheral field of one eye in the monocular occlusion test in order to interrupt completely all phases of binocular vision.

Burian (Burian, H. M.: Fusional movements: Role of peripheral stimula. Arch. Ophth., **21**:486 (Mar.) 1939) in his paper on the role of peripheral stimuli clearly demonstrated the large part they play in binocular vision—so much so that central vision is disturbed if the peripheral stimuli are sufficiently large and intense.

An occluder which will interrupt binocular coördination as completely as possible is by far the best for the purpose of predicting whether or not a patient's symptoms are due to a binocular anomaly. There are several ways of successfully and completely occluding one eye.

303 East Chicago Avenue (11).

TRANSIENT MYOPIA ASSOCIATED WITH ANTERIOR DISPLACEMENT OF THE CRYSTALLINE LENS*

ARTHUR JAMPOLSKY, M.D., AND BERNICE FLOM, O.D.
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This report describes the occurrence of a case of transient myopia of approximately five diopters. The outstanding feature in this case is the observable significant reduction in the depth of the anterior chamber which occurred in synchrony with myopia. Calculations indicate that about 60 percent of the transient myopia in this case could be accounted for on the basis of a transient anterior displacement of the crystalline lens.

Transitory myopia has been mentioned as occurring with diabetes mellitus,[1] diarrhea, icterus, acute nephritis, and influenza. It has also been noted during therapy with sulfonamides and arsenical preparations as well as in a Sippy alkalinity regime.[2]

The case of transient myopia to be described is unassociated with any of the just-mentioned diseases or drugs. The myopia was concurrent with two successive menses in a patient with a confirmed diagnosis of Boeck's sarcoid, with no ocular involvement. The possibility exists that the myopia and the menses were simply coincident phenomena. However, the fact that the patient reported a similar myopic episode during the next menses seems to add strength to a belief that the myopia and the menses are in some way related in this case.

Practically every reasonable variable in the optical system of the eye has been blamed as being the immediate cause of transient myopia. The majority of the explanations describe changes directly related to the crystalline lens, such as (1) spasm of accommodation, (2) changes in lens structure resulting from altered sodium chloride metabolism,[3] (3) edema of the ciliary body producing increased curvature of the lens surfaces,[4] (4) imbibition of fluid by lens,[5] and (5) increased lenticular index of refraction because of "dry salt retention."[6]

The other media and the sclera have also received attention in attempts to explain transitory myopia: (6) changes in the refractive index of the media,[7] (7) differential change in refractive index of the vitreous and aqueous because of differential sugar levels, and (8) stretching of the sclera.[8]

In the case to be presented, a marked reduction in the depth of the anterior chamber was observed during the myopic episodes. Most of the refractive change in this case can be accounted for by an anterior displacement of the crystalline lens.

CASE REPORT

Mrs. E. O., a 35-year-old Caucasian housewife, was first seen on October 20, 1950, with the chief complaint of diminution of distance vision in both eyes for the past 18 hours. She described her near vision as normal and her distance vision as blurred except when she wore her husband's myopia-correcting lenses. Her vision had diminished continually during a period of a few hours on the afternoon of the previous day, the second day of her

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menses. No eye or head pains, halos, diplopia, or other symptoms accompanied her visual loss.

Past history. A diagnosis of Boeck's sarcoid had been made a year previously on the basis of skin lesions on her face and knees, lymphadenopathy, and two biopsies. No ocular involvement had occurred. The patient reported "migraine headaches" with periods of blurred distance and near vision during the latter part of her first pregnancy. There had been no recurrence of these symptoms.

Ocular examination. Uncorrected visual acuity was: R.E., count fingers at eight feet; L.E., count fingers at eight and 10 feet. Manifest refraction showed: R.E., −5.75D. sph. = 20/15; L.E., −4.75D. sph. = 20/15. (No cycloplegic or mydriatic was used because of the shallow anterior chambers. The subjective responses were definite and repeatable.)

Accommodative amplitude was 5.0D. in each eye, by Donder's method. The convergence near point, five cm. from bridge of nose. The extraocular movements were comitant. Intraocular pressure was: R.E., 16 mm. Hg; L.E., 14 mm. Hg (Schiøtz).

The ocular adnexa showed nothing remarkable. Pupils were equal, four mm., round and regular. Direct, consensual, and near reflexes were normal.

Slitlamp examination showed the anterior chamber of the right eye to be practically absent. The iris was in its normal position with respect to the lens but both the iris and lens were displaced anteriorly. There existed only a barely discernible space between the central posterior corneal surface and the anterior lens surface, an estimated 0.5 mm. depth of the anterior chamber axially. The iris was not tremulous. The lens capsule shagreen was normal. No water clefts were visible, nor were any abnormalities of the lens stroma noted.

The slitlamp appearance of the left eye was similar to that of the right eye except that the anterior chamber was somewhat less reduced in depth, there being an estimated anterior-chamber depth of one mm., axially.

Ophthalmoscopy showed the media and fundi to be normal in all respects. No retinopathy or remarkable change in the arteriovenous ratio was evident. Visual fields, tangent screen, 2/1,000 mm. white were normal bilaterally.

General physical examination by a consulting physician was not remarkable. Blood and urine sugars, routine blood and urinalysis were within normal limits.

The patient did not return for reëxamination until 10 days later at which time she stated that her distance vision was normal. She reported that a gradual improvement in her vision had occurred over a period of five hours, and thus normal distance vision was reached approximately 36 hours after the onset of the visual difficulties. Her menstrual flow had been normal in amount and duration.

Ocular examination at this time revealed uncorrected visual acuity to be R.E., 20/20; L.E. 20/20. Manifest refraction showed: R.E., −0.25D. sph. ⊃ +0.25D. cyl. ax. 180° = 20/15; L.E., +0.25D. cyl. ax. 180° = 20/15. Accommodative amplitude was 5.0D., each eye, by Donder's method. Pupils were equal, four mm., round and regular. Direct, consensual, and near reflexes were normal.

Slitlamp examination showed that the anterior chamber in each eye was approximately 2.5 to 3.0 mm. deep along the axis. There was no discernible difference in the anterior-chamber depth of the two eyes. This was in marked contrast to the barely discernible anterior chamber of the right eye as previously noted, and the very shallow anterior chamber which had been noted in the left eye. The iris and lens appeared normal in all respects.

The fundi were again observed to be normal.

Although the patient could not return for reëxamination, she reported that she had experienced a similar episode of blurred distance vision coincident with her next men-

strual period. This menses, of normal amount and duration, had occurred 12 days earlier than expected, which was unusual for her. This time the visual difficulties had begun on the evening of the first day of the menses. The visual loss was described as being approximately half the amount experienced in the previous episode. After 24 hours, her distance vision returned to normal.

Discussion

Having considered the data obtained in this case, we agree that a number of supplementary measurements would have been valuable. However, despite the limited data, certain facts are of interest and some conclusions may reasonably be reached.

The outstanding feature in this case was the observation of the anterior displacement of the crystalline lens. Calculations were made in an attempt to show that a great percentage of the myopia could be accounted for on the basis of a forward shift of the lens, without postulating any other changes in the ocular structures. In the calculations, it is assumed that the anterior-chamber depth (A_2A_3) of the Gullstrand eye[9] was reduced from 3.1 to 0.5 mm. (fig. 1). Then, using the geometric-optics formulas applicable to thick lens systems,[9] calculations were made to determine what change in refractive error would result from this assumed anterior displacement of the crystalline lens in the Gullstrand eye. The calculations were as follows:

Calculations

These calculations are based upon the constants of the Gullstrand schematic eye as presented in Southall's text.[9] An explanation of the symbols and equations used can be found in this text.

As previously mentioned, it is to be assumed that the anterior-chamber depth, A_2A_3, (fig. 1) is reduced from 3.1 to 0.5 mm.

As a result of the change in chamber depth, the total power, F, of the optical system is increased from the 58.64D. of the Gullstrand eye to that of 60.2364D.

$$F = F_{12} + L - cF_{12}L$$

$$c = \frac{0.0031286}{1.336}$$

$$F = 43.053 + 19.110 - \left(\frac{0.0031286}{1.336}\right)(43.053)\ (19.110)$$

$$F = 60.2364\ \text{D.}$$

The location of the principal planes of the new optical system can be determined as follows:

$$\frac{H_{12}H}{n_1} = \frac{cL}{F}$$

$$H_{12}H = \frac{(1.00)\ (c)\ (19.110)}{60.2364}$$

$$H_{12}H = 0.7429\ \text{mm.}$$

Thus, the first principal plane of the system lies 0.7426 mm. behind the first principal plane of the cornea, or 0.6933 mm. behind the anterior corneal surface.

In like manner, using the formula, $P'H'/n_7 = -cF_{12}/F$, the location of the second principal plane of the system can be found to be 0.9708 mm. behind the anterior corneal surface.

Now, according to Southall, the standard Gullstrand schematic eye is 24 mm. in length and is 1.0D. hypermetropic. Let us assume that we now have a Gullstrand eye of 24-mm. length whose optical system power is 60.2364D. and principal planes located as determined above. The following calculations can be made to determine the refractive er-

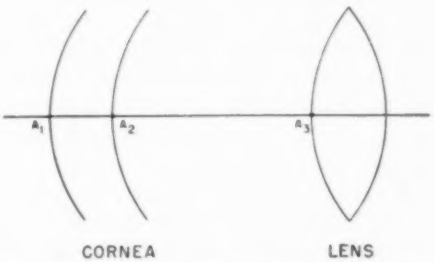

Fig. 1 (Jampolsky and Flom). It is assumed that the anterior-chamber depth (A_2A_3) of the Gullstrand eye was reduced from 3.1 to 0.5 mm.

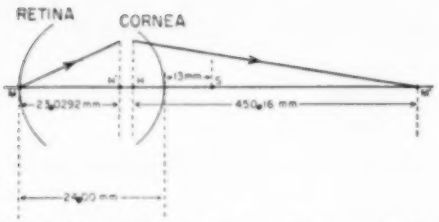

Fig. 2 (Jampolsky and Flom). Diagram showing location of points referred to in calculation of the refractive error of the Gullstrand eye when its anterior-chamber depth is assumed to be reduced, from 3.1 to 0.5 mm.

ror of the Gullstrand eye under the new conditions.

In Figure 2, it is first necessary to determine the location of the point M′ which is conjugate to the point M located at the retina. In the formula, $n'/u' = n/u + F$, let $H'M = u$ and $HM' = u'$.

$$\frac{1.00\ (1000)}{u'} = \frac{(1.336)\ (1000)}{23.0292} + 60.2364$$

$$HM' = u' = 450.16 \text{ mm.}$$

The amount of refractive error with reference to the 13-mm. plane (S) is given by the reciprocal of the distance, SM′, which is the separation of the 13-mm. plane and the point M′. Thus 1,000/436.467 = 2.291 diopters of myopia.

The standard Gullstrand eye is 1.00 diopter hypermetropic. As a result of the assumed change in the anterior chamber depth, the Gullstrand eye is now 2.291 diopters myopic. Thus, a change in refraction has occurred in the amount of 3.29 diopters.

The results of the calculations just given indicate that 3.29 diopters of refractive change in the myopic direction would occur in the Gullstrand eye when the anterior chamber is reduced to the extent indicated. Thus, in the case herein described, approximately 60 percent of the amount of transitory myopia can be accounted for on the basis of the anterior displacement of the crystalline lens, without the need to postulate phenomena such as the imbibition of fluid by the lens, index of refraction changes, accommodative spasm, or stretching of the sclera.

It is doubtful that an accommodative change is involved since the accommodative amplitudes were the same during and after the myopic episode.

Gross structural changes in the crystalline lens did not seem probable since the lens showed no evidence of water clefts or intumescence, nor did the lens capsule appear abnormal. It is realized, however, that none of these factors can be definitely ruled out by the observations mentioned here.

At present one can only conjecture as to the mechanism responsible for the forward movement of the lens. It is of interest to note a case report in the literature[10] describing a patient in whom the anterior chamber became obliterated during attacks of angioneurotic edema with a resultant glaucoma. The author postulated an edema of the ciliary body as a possible mechanism for the anterior shift of the lens.

The occurrence of two episodes of transient myopia concurrent with the menses seems to point to a more than coincidental relationship between the two phenomena. The fact that a marked anterior displacement of the lens-iris diaphragm can occur as a directly observable transient phenomenon apparently associated with some hormonal influence is of interest, and may be a trigger mechanism in the onset of certain cases of glaucoma. The relationship between glaucoma and the menstrual period has been noted previously.[11]

Summary

Two episodes of transient myopia apparently associated with the menses are reported. The outstanding feature in the case is the observable transient anterior displacement of the crystalline lens resulting in an almost obliterated anterior chamber. Calculations are shown which indicate that approximately 60 percent of the resulting myopia can be accounted for on the sole basis of an anterior shift of the crystalline lens.

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We wish to express thanks to Frank W. Weymouth, Ph.D., for checking the calculations in this report.

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RETROLENTAL FIBROPLASIA*

Ophthalmoscopic findings during the first two weeks of life

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Introduction

Periodic ophthalmoscopic examinations have been done in the Bellevue Premature Unit since July, 1949, in an attempt better to define the natural history of retrolental fibroplasia. Two hundred sixty-six premature infants have been examined during the first two weeks of life and periodically thereafter until the diagnosis of retrolental fibroplasia could be made or excluded.

Previous investigators[1-3] have indicated that ophthalmoscopic examination rarely reveals abnormalities at birth, the first significant observations usually being made during the second month of life. In the course of the present study, abnormalities which appeared to be related in some way to retrolental fibroplasia were noted as early as the first few days of life.

In this report we shall present the data on these early ophthalmoscopic findings and attempt to evaluate their significance.

Procedure

This report is restricted to those infants who were examined at least once during the first two weeks of life and periodically thereafter until a diagnosis of retrolental fibroplasia could be made or excluded. At the beginning of the study, the examinations were continued up to the age of six months. It was later realized that, if the eyes were completely normal on careful ophthalmoscopic examination at three months of age, no further signs of retrolental fibroplasia would develop.

All examinations were done by one of us (L. P. G.) with the infants' eyes dilated by one-percent homatropine. The records were kept by a secretary and compiled at the end of the study. At the time of the examinations, the ophthalmologist was not informed of and was usually unaware of the identity of the infant or of the previous findings.

* From the Children's Medical Service, Bellevue Hospital, and the Department of Pediatrics, New York University College of Medicine. Aided by a grant from the National Society for the Prevention of Blindness and by a fellowship from the National Foundation for Infantile Paralysis.

On the basis of the ophthalmoscopic findings, the infants have been classified as follows:

A. ABNORMAL. Infants were classified as abnormal if they presented one or more of the following findings during the first two weeks of life:

1. Vitreous haze
2. Myopia—requiring a minus correction of one or more diopters on the ophthalmoscope
3. Dilatation and tortuosity of the retinal vessels

B. RETROLENTAL FIBROPLASIA. The diagnosis of retrolental fibroplasia was not made unless separation of the retina or cicatrix was present. These are stringent criteria and exclude some cases that might be generally accepted as mild cases of retrolental fibroplasia. However, at the present time they are the only criteria that can be accepted with reasonable safety for a study such as this.

C. NORMAL. This refers to the absence on ophthalmoscopic examination during the first two weeks of life of the findings listed under classification A. To be finally classified as normal, the infant was at least three months old, and usually older, and exhibited no abnormalities on ophthalmoscopic examination.

RESULTS

In Table 1A are listed the over-all results of the study, divided according to birth weight. Of the 266 infants in the study, 77 infants were considered abnormal on the first examination; 12 of these abnormal infants progressed to the advanced stages of retrolental fibroplasia. The eyes of the remaining 65 abnormal infants finally returned to normal. Of the 189 infants who were classified as normal on the first examination, none developed the advanced signs of retrolental fibroplasia.

In Table 1B, the results have been subdivided according to whether or not the infants had been placed in incubators at birth. It will be noted that all infants under 1,500 gm. are routinely placed in incubators at birth. Infants over 1,500 gm. are placed in incubators at the discretion of the nurse and the physician on duty. There are no fixed regulations to guide this decision.

In Table 1C the results have been subdivided according to whether or not the infants were still in incubators at the time the first ophthalmoscopic examination was performed. This information was compiled in retrospect when we realized it would be wise to check the objectivity of the observer in this respect. In a few instances, this in-

TABLE 1A

EARLY DIAGNOSIS AND FINAL DIAGNOSIS PRESENTED ACCORDING TO BIRTH WEIGHT OF INFANTS

Weight Group (gm.)	Total Number of Infants	Early Diagnosis		Final Diagnosis	
				Normal	Retrolental Fibroplasia
Under 1000	1	Abn.	1	1	0
		N.	0	0	0
1000–1499	19	Abn.	14	7	7
		N.	5	5	0
1500–1999	104	Abn.	31	26	5
		N.	73	73	0
2000 and over	142	Abn.	31	31	0
		N.	111	111	0
TOTALS	266	Abn.	77	65	12
		N.	189	189	0

formation was not in the records, and those cases have been omitted from the table.

In Table 2 are listed the early abnormalities, the number of infants who had them, and the frequency with which these infants developed the advanced signs of retrolental

TABLE 1B

FINDINGS SUBDIVIDED ACCORDING TO WHETHER INFANTS WERE IN INCUBATORS AT BIRTH

Weight Group (gm.)			Early Diagnosis		Final Diagnosis	
					Normal	Retrolental Fibroplasia
Under 1000	In incubators	1	Abn.	1	1	0
			N.	0	0	0
	Not in incubators	0	Abn.	0	0	0
			N.	0	0	0
1000–1499	In incubators	17	Abn.	12	6	6
			N.	5	5	0
	Not in incubators	0	Abn.	0	0	0
			N.	0	0	0
1500–1999	In incubators	57	Abn.	20	15	5
			N.	37	37	0
	Not in incubators	35	Abn.	7	7	0
			N.	28	28	0
2000 and over	In incubators	31	Abn.	8	8	0
			N.	23	23	0
	Not in incubators	102	Abn.	21	21	0
			N.	81	81	0
TOTALS	In incubators	106	Abn.	41	30	11
			N.	65	65	0
	Not in incubators	137	Abn.	28	28	0
			N.	109	109	0

TABLE 1C

FINDINGS SUBDIVIDED ACCORDING TO WHETHER INFANTS WERE IN INCUBATORS WHEN FIRST SEEN

Weight Group (gm.)			Early Diagnosis		Final Diagnosis	
					Normal	Retrolental Fibroplasia
Under 1000	In incubators	1	Abn.	1	1	0
			N.	0	0	0
	Not in incubators	0	Abn.	0	0	0
			N.	0	0	0
1000–1499	In incubators	15	Abn.	12	6	6
			N.	3	3	0
	Not in incubators	2	Abn.	0	0	0
			N.	2	2	0
1500–1999	In incubators	37	Abn.	16	12	4
			N.	21	21	0
	Not in incubators	55	Abn.	11	10	1
			N.	44	44	0
2000 and over	In incubators	8	Abn.	6	6	0
			N.	2	2	0
	Not in incubators	125	Abn.	23	23	0
			N.	102	102	0
TOTALS	In incubators	61	Abn.	35	25	10
			N.	26	26	0
	Not in incubators	182	Abn.	34	33	1
			N.	148	148	0

TABLE 2

EARLY OPHTHALMOSCOPIC FINDINGS AND EVENTUAL OUTCOME

Abnormality	Total Number of Infants	Retrolental Fibroplasia	% Retrolental Fibroplasia
Vitreous haze	34	8	23.5
Myopia	11	2	18.2
Dilatation of retinal vessels	16	1	6.2
Haze and myopia	10	1	10.0
Haze and dilatation of retinal vessels	1	0	0
Myopia and dilatation of retinal vessels	3	0	0
Haze, myopia, and dilatation of retinal vessels	2	0	0

fibroplasia. It is readily apparent that vitreous haze is the most significant finding. A combination of abnormalities does not appear to be of worse prognosis than an isolated abnormality.

STATISTICAL ANALYSIS*

The data in Tables 1A, 1B, and 1C were analyzed using statistical methods.

1. The significance of the early diagnosis of "normal" or "abnormal" was investigated by comparing them with the eventual outcome. By applying the chi square formula with Yates's correction, a strong association between the early diagnosis and the eventual outcome was demonstrated, the probability level being less than 1 in 1,000.

In other words, the examiner's diagnosis of "normal" or "abnormal" indicated whether or not infants would develop the advanced stages of retrolental fibroplasia far more reliably than would have been expected from chance alone.

2. The question arose as to whether the observer was being influenced in his early diagnosis by the weight of the child or by whether the child was in an incubator at the time of the first examination. Most factors that might affect the objectivity of the observer were eliminated by the manner in which the study was conducted, but these two factors could not be. Examination of the Tables 1A, 1B, and 1C would suggest that no undue influence was exerted since many infants over 1,500 gm. and not in incubators were also considered abnormal in the first examination.

This impression was tested as follows:

a. Using only the infants under 1,500 gm. and in incubators at the time of the initial examination, a chi square test was done in an attempt to relate the early diagnosis of "normal" or "abnormal" to the final diagnosis.

b. The same was done using only those infants with a birth weight of 1,500 gm. or more and in incubators when first examined.

c. The procedure was repeated with infants of 1,500 gm. or more and not in incubators when first examined.

Subdividing the study group into three parts controlled the two factors we wanted to test but resulted in very small figures. Thus the results of "a" and "b" were not significant and "c" was significant with a probability of 1 in 20. However, since the three tests are independent attempts at measuring the same tendency, it was possible to add the three individual chi-squares. This gave us a probability level of 1 in 100.

This indicates that the examiner's success in selecting "abnormal" infants, as measured by whether or not they developed advanced signs of retrolental fibroplasia, far exceeded what would have been expected by chance; and this was true of the entire group of premature infants regardless of whether they were small or large, in incubators or not.

3. The effect of incubator care at birth (or those factors that lead to the decision to give incubator care at birth) could be investigated only among the infants with a birth weight of 1,500 gm. or more, since incubator care at birth is routine among the lighter infants.

This factor was investigated as follows:

a. The incidence of abnormalities on the

* We are indebted to Dr. Donald Mainland and Mrs. Lee Herrera of the Department of Preventive Medicine, New York University College of Medicine, for the statistical analysis of our data.

first examination among the group of infants who received incubator care at birth was compared with those that did not.

b. The incidence of advanced retrolental fibroplasia in these two groups was also compared.

No significant difference between the two groups could be demonstrated.

4. Inspection of Tables 1A, 1B, and 1C suggests that the smaller the birth weight the more likely the infant will reveal abnormalities on the first ophthalmoscope examination. Thus the ratios of infants with early abnormalities to the total number of infants in each weight group, in order of ascending birth weight were: 14/19, 31/104, 31/142. Application of the chi-square test demonstrated this relation to be highly significant with a probability level of 1 to 1,000.

5. It also appears that the presence of abnormalities at birth has a more serious prognosis the smaller the birth weight. Thus for each weight group in ascending order, the ratios of the number of infants who developed retrolental fibroplasia to the number with early abnormalities were 7/14, 5/31, 0/31.

This relation is significant with a probability level of 1 to 1,000.

Discussion and Conclusion

1. If an infant exhibits no abnormalities on careful ophthalmoscopic examination during the first two weeks of life, it is very unlikely that he will develop the more advanced signs of retrolental fibroplasia, namely retinal separation or cicatrix. In the present series of 189 infants declared normal during the first two weeks of life, none developed such changes.

2. If abnormalities (specifically—vitreous haze, myopia, or dilatation of the retinal vessels) are detected during the first two weeks of life, the infant may or may not later develop the more advanced signs of retrolental fibroplasia. In this series, only 12 infants developed such advanced signs of 77 infants that demonstrated early abnormalities.

3. The incidence of early abnormalities has an inverse relation to the birth weight.

4. The presence of abnormalities during the first two weeks of life has a more serious prognosis among infants with smaller birth weights.

5. The relationship of the early abnormalities to the advanced signs of retrolental fibroplasia may be interpreted in two ways:

a. The "abnormalities" may indicate an eye that is susceptible to retrolental fibroplasia. For example, it may represent an immature eye.

b. The abnormal findings may be the early signs of retrolental fibroplasia. Those infants that revert to normal would then represent abortive cases.

It is impossible to decide between these two interpretations on the basis of the present data.

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Addendum

Since submitting this paper for publication, we have seen one infant who appeared normal during the first two weeks of life and now appears to be developing advanced signs of retrolental fibroplasia.

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THE TREATMENT OF ACUTE SYPHILITIC INTERSTITIAL KERATITIS WITH TOPICAL CORTISONE*

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Introduction

Antisyphilitic therapy has proven of little value in the treatment of syphilitic interstitial keratitis. Study of 90 cases treated at this center from 1944 to 1950 indicates that penicillin used alone or in combination with arsenicals and bismuth has no significant effect upon the course of the eye disease. Klauder[1] and others have reported similar conclusions.

Several authors have recently described the early effects of cortisone and pituitary adrenocorticotropic hormone in this condition. Steffensen and associates[2] in an early report included one case of "atypical" syphilitic interstitial keratitis which showed improvement with parenteral cortisone and ACTH followed by topical cortisone.

Geddes and McCall[3] treated a single case with penicillin plus parenteral cortisone and concluded that improvement was more rapid than would have been expected with penicillin alone. Fitzgerald and others[4] report one case which showed no improvement with parenteral cortisone and ACTH.

Leopold and co-workers[5] noted no improvement in four eyes treated with subconjunctival injections of cortisone. Scheie and associates[6] reported four cases: two treated with ACTH showed very encouraging results after one week, one treated with topical cortisone showed dramatic improvement within two weeks, and one showed no improvement with ACTH or topical cortisone.

Simpson and others[7] in a preliminary report, noted some improvement in eight out of nine cases treated with topical cortisone. Klauder[1] mentions 13 cases treated with either ACTH or cortisone locally with and without parenteral injections. He found that mild and moderate cases were benefited to a variable degree while the severe cases showed no response after seven to 10 days of therapy.

Woods,[8] combining his cases with those of McLean and Gordon, reports a total of 18 cases; six were treated with parenteral cortisone or ACTH with improvement in four, while the remaining 12 received topical cortisone with improvement in 11.

Objectives of the present study, which was begun in July, 1950, were: (1) To determine whether topically administered cortisone was effective in the management of acute syphilitic interstitial keratitis; (2) to determine the time required to produce the optimum therapeutic response; (3) to evaluate the end results of such therapy as compared to conventional treatment; and (4) to evaluate the effectiveness of prolonged maintenance topical cortisone therapy in the prevention of relapse or recurrence.

Results have been sufficiently encouraging that it is considered worth while to report them in some detail at this time.

Method

All patients were admitted to the Midwestern Medical Center where a complete physical examination and thorough ophthalmologic examination were performed. Routine laboratory studies included blood serologic tests for syphilis and examination of the spinal fluid. Since it was considered unlikely that the small amounts of cortisone administered locally would produce any undesirable systemic effects, further laboratory studies were not performed.

Except for two individuals who had received adequate antisyphilitic therapy shortly before admission, all patients were treated with 7,200,000 units of procaine penicillin in oil with two-percent aluminum monostearate given over the 12-day period fol-

* From the Midwestern Medical Center, United States Public Health Service, Saint Louis. Cortisone (Cortone) used in this study was furnished by Merck & Company.

lowing admission. One patient was given hypertherm fever therapy before receiving cortisone, while a second patient received fever therapy when cortisone failed to control severe lacrimation and blepharospasm.

Maximal pupillary dilatation was maintained in each involved eye with a solution of one-percent atropine and four-percent cocaine in castor oil. The cortisone suspension was prepared by diluting cortisone acetate, 25 mg. per cc., 1:4 with isotonic sodium-chloride solution. Thus, the final preparation contained 6.25 mg. of cortisone per cc.

Using a capillary dropper, one drop of the suspension was instilled into the superior conjunctival sac every hour during the daytime (about 15 times daily). In some of the more recently treated cases the drops were used only every two hours. Patients were instructed to keep the eyes closed for 10 minutes after each application. The frequency of administration was gradually decreased as a favorable therapeutic response was obtained.

Beginning in November, 1950, cortisone ophthalmic ointment (2.5 percent) was applied beneath the lower lid at bedtime in an effort to extend therapeutic action over the sleeping hours. The last two cases were treated from the start with cortisone ophthalmic ointment (1.5 percent) applied four times daily. In no instance was cortisone used in an uninvolved eye.

During the period of hospitalization, frequent ophthalmologic examinations were performed on all patients. When the process appeared quiescent, patients were discharged from the hospital with instructions to continue applying the ointment twice daily at home. With only two exceptions all patients have remained under observation and have been examined within recent weeks.

Results

An unusually good follow-up has been obtained, 11 of the cases having been observed for from six to 16 months and six cases for from three to six months.

All patients, with the single exception of Case 6, noted definite symptomatic improvement within the first few days of cortisone therapy. As indicated in Table 1, pain and photophobia usually disappeared by the third or fourth day, although in Cases 6 and 11 mild photophobia persisted for approximately three weeks. Circumcorneal redness disappeared in from six to 18 days.

With only two exceptions (Cases 2 and 12), all slitlamp evidence of active anterior uveitis disappeared in one to six weeks, the average period being between three and four weeks. It is interesting to note that in several of the cases treated early in the course of the disease it later became impossible to detect any evidence of interstitial keratitis by slitlamp examination.

There was considerable variation in the rate of improvement in visual acuity. Several of the cases (5, 13, and 15) responded with surprising promptness. Others improved less rapidly, but to date visual acuity has reached 20/30 or better in 26 of 29 treated eyes. These results appear to be far better than could be expected with any form of antisyphilitic therapy and atropine cycloplegia alone.

Cortisone was discontinued after relatively brief periods of treatment in Cases 1, 2, and 3. In each instance, symptoms returned within three to 14 days. This early experience suggested the advisability of maintenance topical therapy with cortisone ointment. No patient who has adhered to this program has yet developed a recurrence, although one (Case 7) discontinued topical cortisone against advice after eight months of therapy and relapsed 10 days later. Since maintenance therapy has not been deliberately discontinued in these cases, there is as yet no indication of what the final recurrence rate may be.

Case reports

Case 1

A seven-year-old white school girl was admitted July 21, 1950, with the complaint of redness in the left eye and bilateral photophobia of four weeks'

TABLE 1

FINDINGS IN 18 CASES OF ACUTE SYPHILITIC INTERSTITIAL KERATITIS TREATED WITH TOPICAL CORTISONE

Case Number	Duration Syphilitic Interstitial Keratitis before Admission (weeks)		Severity		Treatment Other Than Cortisone		Cortisone			
							O.D.		O.S.	
							Date		Date	
	O.D.	O.S.	O.D.	O.S.	Type	Dates	Begun	Stopped	Begun	Stopped
1	4	4	3+	4+	7,200,000 penicillin	7/27/50–8/7/50	7/28/50 8/5/50 9/4/50	8/2/50 8/18/50 9/27/50	8/2/50 9/4/50	8/18/50 9/27/50
2	2	1	4+	4+	3,300,000 penicillin before adm. 7,200,000 penicillin 7 hyperthermy typhoid vac.	 6/29/50–7/10/50 6/30/50–7/21/50 7/27/50–8/12/50	7/28/50 9/21/50	9/9/50 10/13/50	7/31/50	9/9/50
3		16		3+	7,200,000 penicillin	8/25/50–9/6/50			8/24/50 9/25/50	9/11/50 No
4	6	6	2+	4+	7,200,000 penicillin	8/29/50–9/9/50	8/31/50 9/21/50	11/13/50 No	8/31/50 9/21/50	11/13/50 No
5	8	5 (after adm.)	4+	1+	7,200,000 penicillin	9/15/50–9/27/50	9/16/50	No	10/21/50	No
6	6–7	4–5	4+	4+	7,200,000 penicillin 7 hyperthermy	11/17/50–11/29/50 11/24/50–12/18/50	11/17/50	No	11/17/50	No
7		1 (after adm.)		1+	7,200,000 penicillin	12/7/50–12/19/50			12/18/50 8/24/51	8/2/51 No
8	8	12	2+	2+	None		1/9/51	No	1/9/51	No
9		12		3+	None				1/26/51	No
10	8	33 (after adm.)	4+	1+	7,200,000 penicillin	4/21/51–5/2/51	4/20/51	No	12/14/51	No
11	5		2+		7,200,000 penicillin	5/12/51–5/24/51	5/12/51	No		
12	5	5	4+	4+	5 As+5 Bi before adm. 7,200,000 penicillin	 5/16/51–5/27/51	5/15/51	No	5/15/51	No
13	1	6	4+	4+	8,000,000 penicillin before adm. 7,200,000 penicillin	 5/19/51–5/31/51	5/19/51	No	5/19/51	No
14	3	3	4+	4+	5 inj. penicillin before adm. 7,200,000 penicillin	 5/21/51–6/1/51	5/21/51	No	5/21/51	No
15	1	1 (after adm.)	3+	1+	7,200,000 penicillin	7/10/51–7/21/51	7/10/51	No	7/14/51	No
16	52	48	4+ (old and quiet)	4+	7,200,000 penicillin	7/18/51–7/29/51			7/17/51	No
17		12		4+	7,200,000 penicillin	9/5/51–9/16/51			9/5/51	No
18	1		3+		7,200,000 penicillin	10/1/51–10/12/51	10/1/51	No		

TABLE 1—(*continued*)

Days Required for												
Relief of Pain		Relief of Photophobia		Disappearance of Circumcorneal Redness		Disappearance of Uveitis		Visual Acuity Progress			Relapse		Total Duration Observation (days)
O.D.	O.S.	O.D.	O.S.	O.D.	O.S.	O.D.	O.S.	Dates	O.D.	O.S.	O.D.	O.S.	
2 1 1	3 1	2 1 2	3 2	16 2	19 3	26	26	7/21/50 8/15/50 8/18/50 11/5/50	3/21 20/70 20/30	1/160 20/100 20/70 20/30	8/3/50 9/1/50 No	 9/1/50 No	465
3 1	3	3 1	3	3 2	11	77	77	7/28/50 8/13/50 8/18/50 9/21/50 11/3/50	3/DHM 20/200 20/70 20/25 20/20	3/DHM 20/200 20/80 20/40 20/30	9/21/50 No	No	195
	1 1		1 1		2 1		7 7	8/23/50 8/27/50 8/30/50 9/11/50		2/240 20/50 20/25 20/20		9/14/50 No	303
1	1	3	3	11	11	20	20	8/29/50 12/8/50 9/21/51	20/100 20/60 20/75	3/DHM 20/30 20/30	9/21/51	9/21/51	389
2	No pain	2	10	7	16	11	16	9/15/50 9/18/50 9/23/50 9/27/50	1/240 3/100 20/80 20/20	20/20 throughout	No	No	446
12	12	12 No benefit prior to hypertherm	12 y	28	24	28	28	11/16/50 12/18/50 2/12/51 6/1/51 10/29/51	1/DHM 3/75 20/80 20/80 + 20/40	1/DHM 20/100 20/80 20/30 20/20	No	No	346
	1		10		35		35	12/6/50 12/30/50 1/2/51		20/20 20/50 20/20			
	2		2		15		35	8/24/51 8/27/51 9/4/51 9/24/51		3/150 3/75 20/30 20/20		8/12/51 No	309
1	2	1	18	18	18	18	18	1/8/51 1/14/51 1/25/51 2/12/51	20/150 20/100 20/25 20/20	20/100 20/30 20/20	No	No	314
	6		6		12		16	1/25/51 2/2/51 2/11/51		20/80 20/40 20/25		No	64
1	No pain	3	No photophobia	3	No redness	36	16 +	4/19/51 4/22/51 5/2/51 5/9/51 8/10/51	3/DHM 20/80 20/40 20/25 20/20	20/20 throughout	No	No	241
2		20		13		22		5/12/51 5/15/51 6/4/51 6/18/51 10/15/51	3/100 20/80 20/35 20/25 20/20		No		156
1	1	3	3	13	13	180 +	180 +	5/15/51 5/21/51 5/25/51 5/28/51 6/18/51 7/23/51	2/DHM 3/75 3/24 20/60 20/40 20/20	2/DHM 1/CF 3/240 20/80 20/25 20/20	No	No	230
1	1	2	2	6	6	33	33	5/17/51 5/19/51 5/23/51 6/11/51 10/1/51	3/240 20/200 20/70 20/20 20/20	3/240 20/200 20/80 20/40 20/20	No	No	200
1	1	4	4	7	4	42	25	5/19/51 5/23/51 6/2/51 7/2/51 7/30/51	1/CF 3/240 3/30 20/60 20/20	1/CF 1/240 20/40 20/25 20/20	No	No	223
No pain	No pain	1	2	6	2	13	8	7/9/51 7/11/51 7/23/51	3/75 20/60 20/20	20/20 throughout	No	No	174
	5		5		6		20	7/17/51 7/23/51 7/30/51 8/13/51		3/200 20/100 20/35 20/25		No	153
	No pain		7		7		20	9/4/51 9/7/51 10/1/51		3/120 20/200 20/80		No	104
1		2		7		7		9/29/51 10/5/51 11/4/51 11/12/51	20/100 20/60 20/60 20/25		No		95

duration. There was a history of a similar difficulty in the right eye at the age of three years. Both parents had received antisyphilitic therapy in 1949.

On physical examination, suggestive Hutchinson's teeth, prominent frontal bossae, and thickening of the sternal ends of the clavicles were noted. There was marked photophobia and moderate ciliary redness bilaterally. The right cornea contained a diffuse dense interstitial opacity and vascularity through which only a faint red reflex could be seen. The left cornea had a central disc of dense gray opacity seven mm. in diameter.

Slitlamp examination revealed 15 to 20 keratic precipitates in the right eye and beginning interstitial vascularity running toward the central opacity of the left eye.

Blood Kahn was positive, 512 units. Spinal fluid examination was as follows: cell count 110/3; total protein 32 mg. percent; colloidal gold curve 0000000000; Kolmer positive, eight units.

On July 28th, cortisone therapy was begun in the right eye only. Within 48 hours there was definite relief from photophobia and subsidence of the ciliary injection. By the fifth day the right eye was clearing rapidly and it was possible to obtain a blurred view of the fundus. Only two or three keratic precipitates remained. The left eye still showed no appreciable change.

At this time cortisone was discontinued in the right eye and started in the left, which had been the worse eye clinically. Three days later there was striking improvement in the left eye; the central disc of opacity had shrunk to four mm. in diameter and the blood vessels had receded slightly. The remaining keratic precipitates had disappeared from the right eye, although the photophobia had returned 24 hours after cortisone had been discontinued.

At this point, on August 5th, cortisone therapy was begun in both eyes. Ten days later the disc of opacity in the left cornea was much smaller and on slitlamp examination the interstitial vessels appeared markedly atretic. At no time did the vessels ever invade the area of opacity.

Thirteen days after cortisone therapy was begun in both eyes, the condition appeared entirely quiet and cortisone was discontinued. Visual acuity at this time was 20/30 in the right eye and 20/70 in the left. Slitlamp examination revealed the remainder of the opacity in the left cornea to be breaking up into a cloud of fine punctate dots in the deeper layers.

On September 1st, almost two weeks after the cortisone had been stopped, there was a faint ciliary blush and mild photophobia bilaterally. This was much more marked three days later and cortisone drops were resumed, four times daily.

Again there was rapid relief of photophobia and disappearance of the interstitial vascularity. Cortisone was again discontinued on September 27th.

The patient has been seen since that time at one- to two-month intervals. When last examined on November 5, 1951, the process was entirely quiet and visual acuity was 20/30 in each eye.

Comment. As a rule, in cases with a dense central opacity one can expect improvement only after blood vessels invade the disc and reach the center of the cornea. It was therefore encouraging to observe that the central disc in the left cornea of this case absorbed promptly without blood vessels ever reaching the pupillary area.

Case 2

A 15-year-old white school girl was admitted June 29, 1950, with a history of redness, pain, photophobia, and decreased vision in the right eye for about two weeks and in the left eye for about three days. In the 11 days prior to admission she had received 3,300,000 units of penicillin without benefit. Both parents had previously received antisyphilitic therapy.

Physical examination revealed absence of the xiphoid process and typical severe acute syphilitic interstitial keratitis bilaterally. Blood Kahn was positive, 32 units. Spinal fluid was completely normal.

On admission the patient was started on a full course of penicillin. Hypertherm fever therapy was also begun but, after seven sessions of three to three and one-half hours at 105°F., this had to be discontinued because the patient became violently uncoöperative in the cabinet. Triple typhoid vaccine was then substituted and between July 27th and August 12th she received a total of 15 hours of fever over 103°F.

Topical cortisone therapy was begun in the right eye on July 28th. Visual acuity was reduced to direction of hand movements at three feet in each eye and the condition had remained static for the preceding week.

After three days on cortisone the right cornea was definitely clearing in its periphery and there was marked subsidence of the inflammation. Visual acuity in the right eye had risen to finger counting at three feet. There was no change in the untreated left eye.

At this point, on July 31st, cortisone was started in both eyes. Eleven days later there was marked clearing of both corneas and visual acuity was 10/200 in the right eye and finger counting at two feet in the left. After 16 days, it had further improved to 20/200 in each eye and by the 21st day it was: R.E., 20/70; L.E., 20/80. There were still a few cells in the anterior chambers, but only a few rapidly fading keratic precipitates remained.

On September 9th, after 43 days of cortisone therapy, treatment was stopped. Twelve days later it was noticed that the right eye was slightly red and cortisone was resumed in the right eye three times daily. Visual acuity was: R.E., 20/25; L.E., 20/40, at this time. Both eyes appeared quiet and cortisone was again stopped on October 13th.

The patient was followed until January 10, 1951, at which time the condition was still quiescent and visual acuity was: R.E., 20/20; L.E., 20/30.

Comment. Hypertherm fever therapy produced no rapid response in this case. The fact that rapid improvement was noted in the cortisone treated right

eye while no change was observed in the untreated left eye suggests that improvement was due to cortisone rather than typhoid vaccine therapy.

CASE 3

A 27-year-old Negress, a housewife, was admitted August 23, 1950, complaining of redness, pain, and photophobia recurring in the left eye with her previous three or four menstrual periods and persistent for the past two weeks. From 1940 to 1946 she had received 33 injections of arsenoxide and 27 of bismuth.

Physical examination revealed prominent frontal bossae, saddle nose, and notched incisors. The right eye was entirely normal. The left eye was markedly photophobic and there was moderate circumcorneal redness. Only a faint red reflex was seen and the fundus could not be viewed.

Slitlamp examination revealed a few keratic precipitates and a dense interstitial opacity in the lower two thirds of the left cornea. There was no evidence of any interstitial vascularity. Visual acuity was: R.E., 20/20; L.E., 2/240. The blood Kahn was positive, three units. Spinal fluid examination was normal.

On August 24th, cortisone drops were started in the left eye. Within 24 hours there was decreased pain and photophobia and by the second day these symptoms had completely disappeared. After four days, visual acuity had improved to 20/50. Slitlamp examination showed three or four small keratic precipitates, moderate thickening of the center of the cornea, and moderate irregularity of its posterior surface.

At the end of one week on cortisone, visual acuity was 20/25. On September 11th, visual acuity was 20/20 and slitlamp examination showed a fine diffuse central opacity and slight irregularity of the posterior corneal surface. Cortisone therapy was discontinued and the patient discharged.

She returned September 15th, stating that the left eye had again become red and painful the day before. Visual acuity remained 20/20. A slight ciliary blush was present. The eye appeared at first to respond well to atropine alone, but slitlamp examination on September 25th, showed six or seven discrete deep corneal opacities starting centrally.

Cortisone drops were ordered every two hours and one week later the cornea had entirely cleared. On November 7th, the eye again appeared quiet and cortisone was reduced to three times daily. The patient was discharged on November 17th, with instructions to use cortisone ointment twice daily. On January 16, 1951, the eye was entirely quiet and visual acuity was 20/20 in each eye. Cortisone ointment was reduced to once daily at bedtime. In April and June, slitlamp examination showed only some increased general relucency from the deeper corneal layers.

On September 17th, the patient stated she had stopped using the ointment approximately two and one-half months earlier. The eyes remained entirely quiet, however, and visual acuity was 20/20 in each eye. She was instructed to resume use of the ointment at bedtime. When last seen on January 5, 1952, the eyes remained entirely quiet.

CASE 4

A seven-year-old white girl was admitted August 28, 1950, with the history that during the summer of 1949 a "scum" had formed over the left eye which cleared up after a short time. In July, 1950, the eye again became red and watery. A local physician diagnosed "pink eye" and gave one injection of penicillin without benefit. Both parents had received treatment for primary syphilis just before the patient's birth in 1943.

The patient was underdeveloped and retarded mentally, but there were no other stigmas of congenital syphilis except the eye findings. The left cornea presented a dense interstitial opacity through which the pupil could not be seen. The right cornea presented moderate scarring and vascularization, but it was possible to obtain a good red reflex and a fair view of the fundus which was normal. Visual acuity was estimated to be about 20/100 in the right eye and direction of hand movements at three or four feet in the left.

Blood Kahn was positive, 256 units. Spinal fluid was completely normal.

On August 31st, cortisone drops were begun every hour. Within several hours, the patient stated voluntarily that her eyes no longer hurt; however, mild photophobia persisted for two or three days.

By the 11th day a blurred view of the left fundus could be obtained through the rapidly clearing cornea. Only a few tiny keratic precipitates were found. By the 20th day the two corneas were equally clear and both eyes were entirely quiet.

Cortisone was continued every two hours until September 24th and then gradually tapered off until November 13th when it was discontinued. By December 8th visual acuity had improved to: R.E., 20/60; L.E., 20/30; and the patient was discharged. Since that time she has returned at two- to three-month intervals.

When last examined on September 21, 1951, ophthalmoscopic examination showed an epaulet of deep interstitial blood vessels in the upper quadrant of each cornea extending downward three to four mm. The fundi appeared normal. Visual acuity with best correction was: R.E., 20/75; L.E., 20/30. She was started on cortisone ointment twice daily at this time.

CASE 5

A 10-year-old Negro school girl was admitted September 15, 1950, with the complaint of redness and pain in the right eye for about two months. It was believed that she had received a small amount of treatment, type unknown, when six years of age.

There were suggestive Hutchinson's teeth. A dense diffuse interstitial opacity was noted in the right cornea together with moderate circumcorneal redness. The left eye appeared entirely normal. Visual acuity was: R.E., 1/240; L.E., 20/20. Blood

Kahn was positive, 16 units. Spinal fluid was completely normal.

Beginning September 16th, cortisone drops were administered in the right eye every hour during the daytime. Pain and photophobia promptly subsided and were entirely absent after 48 hours.

At this time visual acuity in the right eye was 3/100 and a faint red reflex was present. By the seventh day visual acuity had further improved to 20/80; the cornea showed remarkable clearing and a moderately clear view of the fundus could be obtained. After 12 days visual acuity was 20/20 and slitlamp examination disclosed no keratic precipitates and no interstitial vascularization.

The right eye remained normal during the subsequent period of observation, but the previously normal left eye developed moderate conjunctival redness and slight interstitial opacity at the lower limbus on October 21st. Cortisone was then used in both eyes and the opacity promptly cleared.

The eyes remained quiet and the patient was discharged on December 21st to continue cortisone ointment twice daily in each eye.

On April 19th, slitlamp examination was negative and visual acuity was 20/20 in each eye. When last examined on December 6, 1951, the process remained entirely quiet and visual acuity was 20/15 in each eye.

CASE 6

A nine-year-old white school girl was admitted November 16, 1950, with the history of redness and photophobia beginning in the right eye six to seven weeks previously and involving the left eye about two weeks later. The patient was referred to the Missouri Trachoma Hospital where, before her transfer to the Midwestern Medical Center, she received a single subconjunctival injection of cortisone without relief.

Physical examination disclosed saber shins and peg-shaped incisors. Both corneas showed a very marked generalized deep vascularization. There was intense photophobia, blepharospasm, and lacrimation bilaterally. With lateral illumination the pupils could barely be made out through the dense corneal opacity. Blood Kahn was positive, 256 units. Spinal fluid was normal.

Beginning November 17th, cortisone drops were instilled in both eyes every hour during the daytime. Three days later the photophobia was slightly decreased. The pupils measured only two mm., although atropine (one percent) with cocaine (four percent) solution in castor oil was used every three hours. Pontocaine (0.5 percent) solution was tried before the cortisone drops were instilled in an effort to reduce the tearing and facilitate absorption of cortisone.

After seven days of treatment, there was still no relief and fever cabinet therapy was started. Within 24 hours there was definite symptomatic relief, but moderate photophobia and blepharospasm persisted. By December 8th, the pupils were well dilated and by December 14th, the patient was able to hold both eyes open. She received five fever cabinet treatments, each one three hours at 105°F.

By December 18th, both eyes were quiet and the corneal opacities were rapidly clearing, especially the left. Visual acuity measured: R.E., 3/75; L.E., 20/100. The eyes remained quiet and on January 29, 1951, the cortisone drops were reduced to every two hours.

By February 12th, visual acuity had improved to 20/80 in each eye. She was discharged on March 12th with instructions to use cortisone ointment three times daily.

When seen one month later, the remaining keratic precipitates were found to be rapidly disappearing although the visual acuity was unchanged. By June 1st, visual acuity was 20/80+ in the right eye and 20/30 in the left. Cortisone ointment was reduced to one time daily at bedtime.

When last seen on October 29th, the eyes remained entirely quiet; visual acuity with correction was: R.E., 20/40; L.E., 20/20.

Comment. The intense tearing in this case may well have washed away the cortisone before it could have any beneficial effect. After blepharospasm and lacrimation were controlled by hypertherm fever, therapy progress paralleled that of the other cases.

CASE 7

A 16-year-old Negro school girl was admitted December 6, 1950, with probable acute rheumatic fever. Her blood serology had been positive in January, 1948, and she had received 10 injections of bismuth between January and May, 1948. There were no stigmas of congenital syphilis except for questionable mulberry molars. On admission there was only a moderate redness of the left conjunctiva. Blood Kahn was positive, 64 units. Spinal fluid was normal.

Penicillin treatment was begun December 7th. Ophthalmic examination on December 11th showed only a slight ciliary blush at the lower limbus on the left; otherwise both eyes were entirely normal. Visual acuity was 20/20 in each eye. On December 18 she presented a typical acute diffuse syphilitic interstitial keratitis of the left eye.

Cortisone drops were ordered every two hours. Two days later the corneal opacity appeared more dense and visual acuity had decreased to 20/50. Thereafter there was gradual improvement so that by January 2, 1951, after 15 days of therapy, visual acuity had risen to 20/20. The few keratic precipitates which had appeared were rapidly fading, and the acute attack was over.

There was almost complete resolution by February 12th and the patient was discharged with instructions to apply cortisone ointment three times daily. On March 27th, this was reduced to twice daily.

On April 16th, slitlamp examination showed no abnormality except for three tiny interstitial blood vessels. During May, June, and July the eyes remained quiet.

On August 2nd, while on vacation, the patient

exhausted her supply of the ointment. About 10 days later she began to notice redness, pain and photophobia, and increasing loss of vision in the left eye.

When examined on August 24th, after her return from vacation, there was moderate circumcorneal redness and dense diffuse corneal opacity in the left eye. Visual acuity was reduced to 3/150. The right eye was normal. Cortisone ointment was applied four times daily in the left eye and at bedtime in the right.

Within 48 hours there was relief of pain and photophobia. The cornea showed progressive clearing and visual acuity improved as follows: August 27th—3/75; October 22nd—20/20. Cortisone ointment was continued twice daily.

CASE 8

A 30-year-old Negro housewife was admitted January 8, 1951, with the complaint of redness, slight pain, and photophobia, and blurring of vision present for three months in the left eye and for two months in the right. Blood and spinal fluid tests were found to be positive in August, 1950, at which time she received 9,000,000 units of penicillin.

Physical examination disclosed suggestive Hutchinson's teeth. Ophthalmic examination disclosed a slight ciliary blush bilaterally.

Slitlamp examination of the right eye showed roughening of the surface of the cornea, diffuse opacity throughout all corneal layers but more marked in the deeper layers, and many small keratic precipitates. There were four posterior synechias in the lower part of the pupil. The left corneal surface was smooth. There were six to eight large mutton-fat and many small gray keratic precipitates, diffuse deep opacity, but no interstitial vessels. Neither fundus could be examined through the dense corneal haze.

Visual acuity with correction was: R.E., 20/150; L.E., 20/100. Fields with 10/350 white were normal. The corneas were definitely small measuring 9 by 9 mm. each. Tension to touch was: R.E., two plus; L.E., one plus.

Blood Kahn was negative. Spinal fluid examination was as follows: Cell count 75/3; total protein 34.5 mg. percent; colloidal gold curve 3322110000; Kolmer positive, eights units.

Cortisone therapy was begun every hour on January 9th. Although the patient had definite microcorneas and glaucoma it was decided to use atropine in an attempt to break up the posterior synechias as soon as possible.

When seen after six days of therapy the pupils were dilated ad maximum. On the right several well-stretched posterior synechias were still present. Intraocular pressure, measured with the Schiøtz tonometer, was: R.E., 72 mm. Hg; L.E., 34 m. Hg. Atropine was reduced to once daily in each eye.

At the end of the second week, the condition remained about the same and atropine was stopped. After 17 days of cortisone therapy, visual acuity had improved to: R.E., 20/25; L.E., 20/30. By the end of the fifth week, visual acuity was 20/20 in each eye. The patient was discharged March 5th to continue on cortisone ointment every three hours.

The intraocular pressure in the right eye gradually fell to 27 mm. Hg on March 26th, while that in the left continued to run between 35 to 46 mm. Hg. The higher pressure in the left eye seems paradoxical; the right pupil had been consistently smaller than the left, and the left eye had considerably lower pressure all during atropinization. Measurements made with different weights all agreed closely, however, and ophthalmometer measurements showed only slight (normal) corneal anisometropia, less than 0.5 diopters. Also there was no doubt that tension was increased to touch in the left while normal in the right.

The patient has been examined every two to three weeks. The fields have been entirely normal with 2/350 white and even 2/350 red. The optic discs remain normal and visual acuity remains 20/20 in each eye.

On April 4th, cortisone ointment was reduced to twice daily. On August 13th, intraocular pressure in the left eye had dropped for the first time—the reading being: R.E., 17 mm. Hg; L.E., 27 mm. Hg.

When examined on October 25th and on November 19th, the eyes appeared quiet and intraocular pressures were again: R.E., 17 mm. Hg; L.E., 27 mm. Hg.

Comment. Eyes with even moderate microcornea are known to carry a bad prognosis when afflicted with glaucoma. Thus, topical cortisone therapy was of special value in this case since it rapidly controlled the acute iridocyclitis so that a successful operation could have been performed if necessary.

CASE 9

A 13-year-old white school girl was admitted January 25, 1951, with the complaint of increasing loss of vision in the left eye for about three months. When the patient was born, the mother was told the baby had congenital syphilis. During her sixth and seventh years the patient was given 40 injections of arsenicals and 46 of bismuth. She was retreated two months before admission with 5,000,000 units of penicillin without benefit.

There were no stigmas of congenital syphilis except the eye findings. The right eye was entirely normal and remained so throughout the period of observation.

Slitlamp examination of the left eye disclosed a dense deep interstitial opacity with old deep blood vessels; no keratic precipitates could be made out through the cloud of opacities. Visual acuity was: R.E., 20/25; L.E., 20/80.

Blood Kahn was negative. Spinal fluid was completely normal.

Penicillin therapy was not repeated. Beginning January 26th, cortisone drops were used in the left eye every two hours. Within seven days there was marked corneal clearing so that many fine, gray

keratic precipitates could be seen. Visual acuity had improved to 20/40.

By the 16th day the keratic precipitates were fading rapidly, visual acuity was 20/25, and the attack appeared to be over. The eye remained quiet when examined at weekly intervals and cortisone was reduced to three times daily on March 5, 1951.

On March 12th, the patient was discharged with instructions to apply cortisone ointment three times daily. On March 30th, there was still considerable diffuse old deep opacity and vascularization. The patient was continued on the cortisone ointment twice daily. Since that time she has not returned.

CASE 10

A 16-year-old Negro school girl was first seen on April 19, 1951, complaining of redness, pain, and photophobia, and progressive loss of vision in the right eye of about two months' duration.

Physical examination disclosed suggestive Hutchinson's teeth. The left eye was normal. The right eye showed marked ciliary and conjunctival redness and diffuse white opacity of the cornea. Visual acuity was: R.E., 3/direction of hand movements; L.E., 20/25. No red reflex was visible in the right eye. The pupil which measured two mm. was seen only with transillumination.

Slitlamp examination revealed a generalized opacity which appeared densest in the deep corneal layers. No interstitial blood vessels were seen. The cornea itself appeared about twice its normal thickness centrally.

Blood Kahn was positive, 1,024+ units. Spinal fluid was normal.

Cortisone therapy was begun April 20th; the drops were used every hour and the ointment was applied at bedtime. Within 24 hours, there was definite relief from the discomfort.

By the third day, the eye appeared white and all photophobia was gone. Visual acuity had improved to 20/80 in the right eye. About 20 to 30 keratic precipitates were seen on slitlamp examination.

By the end of the second week of cortisone therapy visual acuity had improved to 20/40 and the few remaining keratic precipitates appeared to be fading. No areas of opacity or interstitial vessels were visible. There was slight thickening of the center of the right cornea and considerable bilateral symmetrical corneal astigmatism.

At the end of the fourth week the cornea appeared almost completely clear, although a few keratic precipitates were still present. At this point the patient was discharged with instructions to apply the cortisone ointment twice daily.

When examined on August 10th, visual acuity with correction was 20/20 in each eye and use of cortisone ointment was reduced to once daily at bedtime.

When examined on December 14th, the eyes were grossly normal. Slitlamp examination, however, disclosed 15 to 20 small dewdroplike keratic precipitates in the previously uninvolved and untreated left eye. There was no evidence of any interstitial opacity. Cortisone ointment was begun twice daily and, by the end of the first week of therapy, the keratic precipitates were rapidly fading and there was no further evidence of interstitial keratitis in the left eye.

CASE 11

A 13-year-old white school girl was admitted May 11, 1951, complaining of increasing redness and photophobia in the right eye for the previous five weeks. The patient's father had received antisyphilitic treatment in 1929. The patient had received three injections of penicillin daily for seven days in 1949 because of appendicitis.

There was moderately severe ciliary redness and intense photophobia in the right eye. The right cornea was diffusely cloudy. No view of the fundus could be obtained, but a few large gray keratic precipitates could be seen, especially centrally. There were no interstitial blood vessels. The left eye was normal. Visual acuity was: R.E., 3/100; L.E., 20/20. Blood Kahn was positive, 128 units. Spinal fluid was normal.

On May 12th, the patient was started on cortisone drops every two hours and cortisone ointment at bedtime. By the third day visual acuity had improved in the right eye to 20/80 and the ciliary redness was much less, although by mistake no atropine had been used. Mild photophobia persisted for several weeks.

After one week the cornea showed marked clearing. Visual acuity remained unchanged, however, until June 4th when it was 20/35. A star-map arrangement of fading keratic precipitates was seen, and it was felt that the acute attack was over. The patient was discharged at this point with instructions to apply the ointment twice daily.

On June 18th, after five weeks of cortisone therapy, the eye appeared entirely quiet and visual acuity was 20/25. On July 18th, there was still a faint rim of corneal opacity in the upper temporal quadrant. Atropine was stopped.

On September 4th, there was again some slight photophobia and tearing in the right eye. Slitlamp examination, however, showed no evidence of active inflammation and the patient was continued on cortisone ointment twice daily. When last examined on October 15th, the eye was quiet and visual acuity had improved to 20/20.

CASE 12

A 15-year-old white school girl was admitted May 15, 1951, with the complaint of severe redness and photophobia in both eyes for five weeks. A sister had been treated for congenital syphilis three years earlier. After the onset of symptoms the patient was given five injections of bismuth and one of arsenicals without benefit.

Hutchinson's incisors were noted. There was bilateral ciliary redness and severe photophobia. The right cornea was a light salmon color above and below; the left cornea was very gray and opaque. No red reflex was visible on the right and only a faint one on the left. Visual acuity was reduced to 2/direction of hand movements in each eye.

Blood Kahn was positive, 16 units. Spinal fluid examination was: cell count, 37/3; colloidal gold curve, 2110000000; Kolmer, negative.

On May 15th, therapy was begun with cortisone drops every waking hour and cortisone ointment at bedtime. Pain was relieved within 24 hours and by the third day photophobia was much less. By the sixth day, visual acuity had improved to: R.E., 3/75; L.E., finger counting at one foot. Both eyes now showed a mass of large keratic precipitates, about 200 being visible in the right and about 150 in the left.

By the 10th day ciliary redness was almost entirely gone and visual acuity was: R.E., 3/24; L.E., 3/240. At the end of the second week the eyes seemed entirely quiet and visual acuity was: R.E., 20/60; L.E., 20/80; the cortisone drops were reduced to every two hours.

On June 4th, after 20 days of treatment, visual acuity remained the same although the left cornea was very much clearer than the right. The better visual acuity in the right eye appeared to be due to the fact that there was a one-mm. strip of relatively clear cornea across the center of the pupillary area giving a stenopeic effect.

Visual acuity continued to improve so that by June 18th it was: R.E., 20/40; L.E., 20/25. The patient was discharged on July 2nd with instructions to continue applying the ointment twice daily. She has been seen since at approximately two-week intervals.

On July 23rd, visual acuity was 20/20 in each eye although there was still considerable opacity in the right cornea. Slitlamp examination showed the usual interstitial opacity and vascularization and, in addition, a few keratic precipitates in the right eye and 10 to 20 tiny keratic precipitates in the left.

On October 15th, the process appeared entirely quiet except for three tiny keratic precipitates remaining in the right eye. When last seen on December 31, 1951, the right cornea showed further clearing and the remaining keratic precipitates were definitely disappearing.

Comment. The fact that she did not keep the eyes closed for 10 minutes after application of the cortisone ointment may be partially responsible for the continued activity of the uveitis in this case. There has been consistent improvement since she has begun to follow instructions.

Case 13

An 18-year-old farm worker was admitted May 17, 1951, with a history of redness, photophobia, and progressive loss of vision in the left eye of six weeks' duration. Shortly after the onset of symptoms, the patient's serologic test for syphilis was found to be positive and 8,000,000 units of penicillin were administered without benefit. Redness and photophobia first appeared in the right eye one week before admission.

On *physical examination* questionable Hutchinson's incisors were noted. Both eyes showed marked redness and photophobia. The corneas were diffusely gray. Tufts of gross deep vascularization (salmon patches) invaded the right cornea for three to four mm. from the limbus at the 2-, 4-, and 9-o'clock positions. There was a large salmon patch coming from the upper temporal limbus and covering about two thirds of the entire left cornea. Visual acuity was 3/240 in each eye.

Blood Kahn was positive, 128 units. Spinal fluid was normal.

On May 19th, cortisone drops every waking hour and cortisone ointment at bedtime were begun. Within two days, the redness had faded and photophobia was gone. The salmon patches were no longer grossly visible and visual acuity had improved to 20/200 in each eye.

By the sixth day the eyes appeared quiet on gross examination and visual acuity was right eye 20/70 and left eye 20/80. On the ninth day only a few keratic precipitates were visible. Both corneas continued to clear, the left more slowly than the right. Visual acuity gradually improved, reaching 20/20 in the right eye and 20/40 in the left on June 11th.

The patient was discharged on July 3rd with instructions to continue applying the ointment twice daily. On October 1st, the eyes appeared entirely quiet and visual acuity had improved to: R.E., 20/20; L.E., 20/30. When last examined on December 3, 1951, the condition was essentially the same and topical cortisone therapy was continued.

Case 14

A nine-year-old white school girl was admitted May 19, 1951, with a history of redness, photophobia, and decreasing vision present in both eyes for about five weeks. Three weeks before admission she was found to have a positive serologic test for syphilis and was given five injections of penicillin without benefit.

Subnormal mentality and prominent frontal bossae were noted on physical examination. There was severe photophobia and moderate circumcorneal redness bilaterally. Both corneas were diffusely gray and the left contained a dense salmon patch coming in from the limbus at the 7- to 8 o'clock position and covering the nasal third. The pupils could barely be seen and no red reflex was visible. Visual acuity was reduced to finger counting at one foot in each eye.

Blood Kahn was positive, 512 units. Spinal fluid examination was: cell count, 89/3; colloidal gold curve, 0000000000; Kolmer, negative.

Beginning May 21st, cortisone drops were used every hour and the ointment was applied at bedtime. After one day the patient stated that her eyes "felt better." By the fourth day the redness had almost completely subsided and photophobia was absent. Visual acuity was: R.E., 3/240; L.E., 1/240. Both corneas showed marked clearing.

After 14 days, the left cornea was almost entirely clear and the right had cleared everywhere except centrally where there was a dense disc of opacity four mm. in diameter. Visual acuity was: R.E., 3/30; L.E., 20/40. Cortisone drops were stopped and the ointment was applied twice daily.

On June 18th, after four weeks of cortisone ther-

apy, only a few fading keratic precipitates were seen in each eye. The left cornea appeared clear but the central disc of opacity in the right remained little changed. The patient was discharged with instructions to continue the ointment twice daily.

On July 30th, the right cornea appeared clear except for a one-mm. patch in the upper pupillary area and visual acuity had reached 20/20 in each eye. The patient was last seen on August 27th, at which time no trace of interstitial keratitis could be seen with the ophthalmoscope although some opacity was still visible with the slitlamp.

CASE 15

A 13-year-old Negro school boy was admitted July 9, 1951, with a history of redness and photophobia in the right eye for one week.

There were no stigmas of congenital syphilis except for the eye findings. The left eye was normal. The right eye exhibited moderate circumcorneal redness and a dense deep corneal opacity. Visual acuity was: R.E., 3/75; L.E., 20/20. Blood Kahn was positive, 64 units. Spinal fluid was normal.

On July 10th, cortisone therapy was started in the right eye; drops were used every two hours and the ointment at bedtime. By the second day photophobia was absent and there was marked clearing of the opacity so that visual acuity had improved to 20/60. On the fourth day mild photophobia and redness first appeared in the left eye and cortisone therapy was begun in it also. The redness and photophobia promptly subsided.

On July 16th, two days after cortisone was begun in both eyes, slitlamp examination revealed three keratic precipitates present in the left eye, but no other evidence of interstitial keratitis. By July 23rd visual acuity had improved to 20/20 in each eye. After 27 days of therapy, the patient was discharged with instructions to use the ointment twice daily at home.

On August 20th, the few keratic precipitates remaining in the right eye seemed to be fading rapidly. The patient was last seen on December 31st at which time the process appeared entirely quiet. He has been continued on cortisone ointment twice daily in both eyes.

CASE 16

A 13-year-old white boy was admitted July 17, 1951, with the complaint of redness, pain, and photophobia, and decreasing vision beginning in the right eye one year previously and involving the left eye about one month later. Several months before admission the condition became much worse and the patient sought medical attention. The mother's blood test has since been found to be positive.

The patient was a rather frail, undernourished boy of subnormal mentality. Examination of the right eye revealed an old, quiet interstitial keratitis at the upper limbus. The left cornea contained intense deep vascularization (salmon patch) in the lower nasal quadrant. Only a very dim red reflex was visible and visual acuity was estimated at not better than 3/200.

Blood Kahn was positive, 1,024 units. Spinal fluid examination was: cell count, 459/3; total protein, 33 mg. percent; colloidal gold curve, 2211000000; Kolmer positive, 8 units.

On July 17th, cortisone therapy was started in the left eye; the drops were administered every two hours and the ointment was applied at bedtime. Within several days, there was definite relief from pain and photophobia and by the fifth day there was marked corneal clearing. Visual acuity steadily improved, reaching 20/35 on the 13th day of therapy.

At this point, on July 30th, use of the cortisone solution was reduced to four times daily. On August 13th, both eyes appeared quiet and visual acuity was 20/25 in each eye. Use of the drops was reduced to twice daily.

On August 20th, there was almost complete resolution of the salmon patch in the left cornea so that with the slitlamp only two or three tiny vessels were visible. The patient was discharged on August 22nd with instructions to apply the cortisone ointment twice daily.

On September 28th, the process appeared entirely quiet and visual acuity was 20/25 in each eye. When last examined on December 17, 1951, the condition remained entirely quiet and topical cortisone therapy was continued.

CASE 17

A 16-year-old white school boy was admitted September 4, 1951, with the complaint of redness, photophobia, and decreasing vision in the left eye for three months.

There were no stigmas of congenital syphilis except for the eye findings. The right eye was entirely normal. The left eye was markedly photophobic. There was moderate circumcorneal redness, marked tearing, and diffuse, dense corneal clouding. Visual acuity was 3/120.

Blood Kahn was positive, 1,024 units. Spinal fluid was normal.

Beginning September 5th, cortisone ointment (1.5 percent) was applied in the left eye four times daily. Photophobia was greatly relieved by the second day of therapy, although slight photophobia and redness persisted for the first week. The cornea showed definite clearing and by the fifth day visual acuity had improved to 3/30. Thereafter corneal clearing was quite slow although the process appeared entirely quiet.

On October 1st, visual acuity was 20/80. Since that time, slight diffuse corneal haziness has persisted and visual acuity remains unchanged. On November 5th, therapy was changed to cortisone drops every two hours during the day with the ointment used only at bedtime. One week later there was little change.

When last examined, on December 17, 1951, visual acuity remained about the same although the cornea appeared somewhat clearer.

CASE 18

A 16-year-old white school boy was admitted

September 29, 1951, with a history of pain and photophobia in the right eye for one week.

There were no stigmas of congenital syphilis except for the eye findings. The left eye was entirely normal. The right eye was markedly photophobic, with diffuse corneal clouding. The fundus could not be seen although there was a good red reflex. Visual acuity was: R.E., 20/100; L.E., 20/25. Blood Kahn was positive, 32 units. Spinal fluid was normal.

Beginning October 1st, cortisone ophthalmic ointment (1.5 percent), was applied to the right eye every four hours during the day. Pain and photophobia were relieved by the second day. By the fourth day the cornea had cleared somewhat so that a fair view of the fundus could be obtained. After one week the process appeared quiet and visual acuity had improved to 20/60.

Thereafter the patient was carefully examined at weekly intervals. Moderate diffuse cloudiness persisted and visual acuity remained 20/60.

Beginning November 5th, the ointment was applied only at bedtime while the drops were administered every two hours during the day. One week later visual acuity had improved to 20/25 and the cornea began to show considerable clearing. He was last examined on December 3, 1951, at which time visual acuity was the same.

Discussion

Although 16 of the 18 cases in the present study received large amounts of intramuscular penicillin in addition to topical cortisone, certain observations would suggest that penicillin played a relatively unimportant role in producing the beneficial results obtained.

Three of the patients received penicillin elsewhere during the acute stage without appreciable improvement in the eye condition. Two patients developed the initial attack of syphilitic interstitial keratitis despite previous adequate penicillin therapy. One exhibited a typical beneficial response to topical cortisone alone; the second received penicillin in addition.

In two other cases involvement of the second eye occurred during or following vigorous penicillin therapy. A relapse of the syphilitic interstitial keratitis occurred in five patients in the series following adequate penicillin therapy. That all such cases have responded well to topical cortisone alone, without further antisyphilitic therapy, is additional support for the view that penicillin has little clinical effect on acute syphilitic interstitial keratitis.

There is general agreement, however, that antisyphilitic therapy is indicated, if for no other reason than to prevent or arrest other possible manifestations of late congenital syphilis. Best results have heretofore been obtained with a combination of antisyphilitic and artificial fever therapy.

Although no precise comparison is possible, the clinical results in the present series of cases appear to be markedly superior to those obtained with penicillin plus fever-cabinet therapy. It has been especially gratifying to note that signs of anterior uveitis disappeared promptly, whereas many patients treated with artificial fever required atropine for many months after acute symptoms subsided before the accompanying low-grade uveitis was controlled. We believe, however, that artificial-fever therapy may continue to be valuable in an occasional severe case,

That the measurable effect of topical cortisone is a local one is clearly demonstrated in those cases with bilateral eye involvement in which cortisone was used alternately in only one eye without benefit to the untreated eye. This is also apparent from the fact that use of cortisone in cases of unilateral eye involvement does not prevent involvement of the second eye. We have not attempted to prevent second eye involvement in unilateral cases by use of topical cortisone in the normal eye. Instead we now advise all patients to begin use of cortisone ointment at the first sign of trouble in the uninvolved eye.

On the basis of the present study we are unable to state with certainty the optimum concentration and frequency of administration of topical cortisone. It is possible that a lower concentration and decreased frequency of administration would give equally satisfactory results. We have not varied the concentration since the strength initially adopted produced satisfactory results without evidence of local irritation.

Patients who received cortisone drops at two-hour intervals apparently responded as well as those treated every hour. There has been no attempt to evaluate the effectiveness

of more widely spaced initial administration. While on theoretical grounds it would seem desirable to prolong the cortisone effect over the sleeping hours, there was no detectable difference in the response of those patients who also applied cortisone ointment at bedtime.

In the last two cases, which were treated from the beginning with four daily applications of cortisone ophthalmic ointment (1.5 percent), clinical response was apparently less rapid than that produced in comparable cases by instillation of cortisone drops.

It should be reëmphasized that, with all previous forms of therapy, recurrences have been common, occurring in as many as 15 to 20 percent of well-treated cases.[1] The fact that recurrences become less frequent as the time interval following therapy increases suggests that this problem may become less significant when topical cortisone therapy is prolonged.

That such a program will probably not prevent all recurrences is demonstrated by one of the cases in this series which promptly relapsed when, after eight months, cortisone was discontinued. Since this patient was promptly controlled with cortisone ophthalmic ointment (2.5 percent), it may be that in this strength the ointment will prove as effective as the drops.

In every case in which cortisone therapy has been continued according to instructions, the prompt and often dramatic results obtained during the early period of treatment have been maintained. We believe that it is possible to continue such therapy safely almost indefinitely. There have been no undesirable side effects, either locally or systemically, following daily administration for periods up to 16 months. In our experience, patients do not develop resistance or intolerance to the drug even after prolonged administration.

We believe that topical cortisone therapy, since it requires neither hospitalization nor special laboratory facilities, is suitable for use in office practice. Such therapy is inexpensive and without apparent danger. Nealy all patients have coöperated willingly and have experienced no difficulty in self-administration of the ointment.

An ambulatory program is of special value in treating a condition which tends to run a chronic course and occurs predominantly in individuals of school age. The importance of early diagnosis and treatment, before irreversible scarring occurs, should be emphasized.

The fact that at least five patients in this series had parents or siblings who were treated for syphilis a number of years before the patient developed syphilitic interstitial keratitis again points to the need for earlier and more careful investigation of all familial syphilis contacts.

Addendum

Since February, 1952, one additional patient has been treated with results essentially similar to those already reported. At present, 15 of the cases have been observed for periods ranging from six to 27 months. These patients have all been continued on topical cortisone therapy without evidence of recurrence in any case. In Case 6, visual acuity has further improved to 20/30 so that a final visual acuity of 20/30 or better has now been attained in 27 of 29 treated eyes.

Conclusions

1. Topical cortisone was used in the management of 18 cases of acute syphilitic interstitial keratitis observed for periods ranging from two to 16 months.

2. Subjective symptoms of pain and photophobia were usually relieved within three or four days and circumcorneal redness cleared in from six to 18 days.

3. Slitlamp evidence of active anterior uveitis disappeared in all except two cases in from one to six weeks, the average period required being three to four weeks.

4. There was progressive clearing of the cornea in all cases. A final visual acuity of 20/30 or better has been obtained in 26 out of 29 treated eyes.

5. No patient who has continued on maintenance topical therapy with cortisone ophthalmic ointment (1.5 percent), once or twice a day has developed a recurrence. However, three patients experienced a recurrence when topical cortisone was discontinued after relatively brief periods of therapy and one after eight months. In each case the recurrence was promptly controlled when treatment with cortisone ophthalmic ointment was resumed.

6. Topical cortisone therapy, used as outlined, has proved to be effective, inexpensive, safe, and simple to administer. While we feel it is definitely indicated in all cases of acute syphilitic interstitial keratitis it is noted that an occasional severe case may still require artificial fever therapy.

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A STUDY OF GLAUCOMA SECONDARY TO CATARACT EXTRACTION*

Based on 500 Senile Cataract Extractions

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The purpose of this paper is to review the histories of 35 cases of glaucoma following cataract surgery in eyes not previously affected by glaucoma. These were the eyes of 30 patients from a series of 500 cataract operations, consecutive except for the omission of those eyes known to have preoperative glaucoma. These 35 eyes constitute seven percent of the total number operated on.

The question arises why we believe that a presentation of our ideas on how to avoid complications that may cause glaucoma and how to treat the glaucoma when it occurs may be of value inasmuch as the incidence of glaucoma in this series is not below average, nor is the outcome better.

It was thought that, since it requires a critical analysis of surgical results to determine causes for failure and results of treatment, not many have the time or interest to make such studies and it is only thus that we get away from erroneous "clinical impressions." Such analyses through the years have slowly led to the present surgical rou-

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tine that latterly seems to have created a definite improvement. Obviously, not all of the procedures described were introduced at one time, but represent a gradual evolution of ideas.

The technique of operation varied somewhat, but in most recent cases was as follows:

Local anesthesia of five-percent cocaine and adrenalin instillations, three times at three-minute intervals; injection subconjunctivally of about 0.25 cc. of this solution close to the limbus at the 12-o'clock position; akinesis with two-percent procaine and adrenalin after the method of van Lint; retrobulbar injection of 1.5 to 2.0 cc. of this solution; a conjunctival flap dissected upward from the limbus in the upper half of the circumference of the globe; introduction of two McLean sutures; one peripheral iridectomy at 12 o'clock; extraction of the lens in capsule with Arruga forceps with counterpressure from the 4- to 8-o'clock positions; McLean sutures tied; toilet of wound; conjunctival flap pulled down over incision and sutured just below the horizontal meridian on each side of the cornea.

A Parke-Guyton speculum was used as was a halter suture through the tendon of the superior rectus to depress the eyeball. There was, however, some variation in technique as time passed. Occasionally the capsule ruptured involuntarily and once in a while an extracapsular operation was performed intentionally. In some cases general anesthesia of sodium pentothal was used. Rarely, an erisophake or Verhoeff forceps, instead of an Arruga, was employed in cases of hypermature lenses.

It is intended to discuss the causes of postsurgical glaucoma and to suggest means of avoiding them, and lastly the treatment of glaucoma when it does occur.

Causes of postsurgical glaucoma

Several interesting reports on this subject have appeared in the literature of the last 10 or 12 years. A few of these deal with the problem in a manner similar to that proposed by us and so are summarized here.

Review of literature

In 1940, Kronfeld and Grossman[1] wrote a paper which suggested that a closed angle as viewed with a gonioscope at the time of discovery of the glaucoma associated with delayed restoration of the anterior chamber, varying from two to 30 days and averaging about seven days, was present in 28 out of 32 eyes. This was the only complication in 17, but in 15 there were other complications such as loss of vitreous, retention of much lens cortex, late rupture of wound, iris prolapse, and hemorrhage into the anterior chamber.

In our cases, routine examination of the angle with a gonioscope was not made, hence some, and possibly many, cases of closed angle were undoubtedly not tabulated as such in our group.

In 1948, Owens[2] reported on 87 cases of glaucoma following cataract extraction in 2,086 patients at the Wilmer Institute from 1925 to 1943. The incidence of complications attributed as causes of the glaucoma were:

1. Iridocyclitis, 19.4 percent. The chief cause of this iridocyclitis was cortex.

2. Vitreous loss, 10 percent. To prevent this, adequate anesthesia including block of orbicularis, retrobulbar injection, Parke-Guyton speculum, and round pupil (in this study vitreous loss occurred in only 2.7 percent in extraction with round pupils, and 10.6 percent with complete iridectomy).

3. Delayed reformation of anterior chamber, causing peripheral anterior synechias. To avoid these he suggests corneoscleral sutures; pilocarpine to prevent iris crowding into angle; and air injection if the anterior chamber does not reform in six days.

4. Iris prolapse, prevented by good wound closure and removing incarcerated lens capsule or protruding iris.

5. Epithelial downgrowths, avoided by good wound closure.

6. Block between posterior and anterior chambers. Treatment: 37.9 percent of the cases were controlled without surgery. Nine-

teen were observed for at least one year. If miotics fail, Owens thinks that operation is indicated. As the operation of choice, he advocated cyclodialysis.

Meyer and Sternberg[5] in 1950 reported 54 cases of postoperative glaucoma in 968 cases of senile cataract extraction. In these they used only conjunctival sutures for wound closure. Their incidence was 5.5 percent. The causes were attributed to:

1. Delayed reformation of the anterior chamber, 37.04 percent.
2. Hemorrhage into the anterior chamber postoperatively, 20.3 percent.
3. Vitreous loss, 14.8 percent.
4. Iris prolapse, 5.55 percent.
5. Postoperative inflammation about 3.7 percent.

Of these cases, 27.7 percent had preoperative glaucoma.

In 1946, McPherson[4] reported the results in 52 cases in which cyclodialysis controlled tension for at least one year in 38.5 percent (quoted by Owens).

Complications in present study

Certain complications at operation as well as postoperatively seem to account for all but four of our 35 cases. The complications were as follows:

At operation. Vitreous loss, 37.14 percent.

Postoperatively. (1) Hyphema, 14.3 percent; (2) iritis or iridocyclitis, 14.3 percent (of these the iritis was associated with vitreous loss in 11.4 percent); (3) flat or shallow anterior chamber, 5.5 percent; (4) vitreous bead in wound, 5.5. percent; (5) iris prolapse in a severe diabetic, 2.86 percent; (6) epithelial downgrowth, 2.86 percent; (7) corneal edema, 2.86 percent; (8) choroidal detachment, 5.5 percent; (9) detached retina, 5.5 percent; (10) wound infection, 2.86 percent; (11) three days of vomiting, also a shallow anterior chamber, 2.86 percent.

Operations for glaucoma were performed only in cases that did not respond to drugs and in only those where operation seemed to present hope. For example, it was not done in two cases of detached retinas.

Surgery was performed in six cases as follows: cyclodialysis in five with tension controlled in three; iridectomy in one with tension controlled and final vision of 20/60. Final vision after cyclodialysis was 20/20; 20/30; 3/150; L.P.; and no L.P.

Discussion of complications and treatment

It seems safe to state that postoperative glaucoma in previously nonglaucomatous eyes can almost always be attributed to some unfortunate event connected with the surgery, though there may be a propensity toward glaucoma as evidenced by five patients in our series who developed glaucoma in *each* eye following surgery and four patients in whom nothing could be found to account for the development of intraocular hypertension. One must, therefore, consider in great detail how operative and postoperative complications can be avoided.

Preoperative care

Vitreous loss ranks high in all statistics on this subject, so that a study of its causes and prevention is a primary necessity. Care to relieve the patient's mind of anxiety, in so far as possible, by discussion with him before operation is helpful.

Sedation, when necessary, is important and may be induced with phenobarbital, 30 mg., three or four times a day for a few days before surgery. Nembutal, 0.09 gm., one and one-half hours before operation and again one hour preoperatively is sometimes adequate to produce a good relaxation, but the addition of 50 or 100 mg. of demerol is almost sure to cause adequate disinterest of the patient in the procedure.

Useful in akinesis is hyaluronidase added to the two-percent procaine. The commercial Wydase (Wyeth, Inc.) adds greatly to the effectiveness of either the van Lint or O'Brien methods of injection for paralyzing the orbicularis. The use of hyaluronidase was adopted only after the conclusion of this series of cases.

For the retrobulbar injection we prefer half strength Wydase in order not to have too soft a globe. About two cc. of this should be injected into the muscle cone. Two fascial planes must be penetrated and as each is reached, a definite resistance is met. The needle should be very sharp, 25 gauge, and about 60 mm. in length. It is easiest to inject through the anesthetized skin at the junction of the outer and middle thirds of the lower lid and about 10 mm. below the lid margin.

If by chance the eye is so soft that the lens cannot be grasped readily with the forceps or erisophake, counterpressure by the assistant over the ciliary body at the 12-o'clock position will harden the globe adequately for grasping. It is seldom that vitreous will be lost from a soft eye, hence the value of the retrobulbar injection which will cause this. If vitreous loss does occur, it will be less in amount than if the eye is not soft.

It is essential that no unnecessary pressure should be made on the eyeball during the surgery. If the akinesis is incomplete and a speculum is used so that squeezing of the lids may result in pressure on the globe, there is danger. The Parke-Guyton speculum will prevent this for the most part. Other methods to accomplish the same thing are retraction with lid sutures or small lid clamps attached to threads such as those devised by Castroviejo.

Injection of the extraocular muscles with procaine may be used or curare given systemically. The employment of this drug is now routine in our surgery where pentothal anesthesia is employed and is used in the strength of 30 mg. (100 units) per gm. of pentothal (dissolved in 15 cc. of sterile distilled water). Curare was not used in this series of patients.

Good anesthesia is necessary for success. Anesthesia similar to that used locally is employed as an adjunct to the general anesthetic so that, if the latter is not deep (and this may occur in the endeavor to prevent giving more than necessary, which might cause postoperative vomiting), the patient will not be subjected to surgical pain.

Good control of the globe is important and this can be obtained by a halter suture which is placed at least 20 mm. behind the limbus through the anesthetized tendon of the superior rectus, and secured by two or three loops around the knob on the speculum.

A valuable procedure, in order to be certain that the nasal border of the opening in the eye sheet does not shut off the light on the field or obstruct the view by flaring away from the nose, is the application of sterilized "dermatome," suggested by Dr. Oscar Dahlene, to the skin of the nose and face below the eye and pressure of the nasal rim of the eye aperture against this until it is firmly adherent. The adhesion is not so tight but that it can be readily pulled off when the sheet is removed. The "dermatome," a substance much used in skin grafting, is easily applied with a cotton applicator from a stock solution kept in a small bottle.

Postoperative complications

Many of the postoperative complications that seemed to be related to the development of glaucoma have to do with wound closure. These are hyphema, flat anterior chamber, vitreous bead in the incision, iris prolapse, and epithelial downgrowths, making 30.8 percent of the total in our series.

Most argument as to whether these complications were due to faulty wound closure would be as to hyphema. However, a careful study of these cases reveals, as has been pointed out by others, that almost always the bleeding starts as a streak extending downward from the region of the 12-o'clock position over the iris and pupil. These are the well-known "late" hemorrhages taking place from five to eight days after surgery. There is good evidence to show that they are due to the rupture of the newly formed blood vessels crossing the recent incision, occasioned by undue ocular movements, increased blood flow, as from lifting or stooping, pressure on the globe, coughing,

sneezing, vomiting, and so forth.

One of us (L. T. P.) was at one time plagued by these hemorrhages after cataract surgery. At that time, a limbal incision was being made under a conjunctival limbal-based flap. This placed the incision in a very vascular area. In discussing this with Dr. B. Y. Alvis, it was learned that he had had similar trouble until it occurred to him to place the section further in the cornea and that thereafter this complication had been almost completely averted. This also proved to be true in our cases.

Hence, the section is now made one mm. in the clear cornea. This necessitated a change in procedure so thereafter a pull-down flap of conjunctiva, previously dissected upward from the limbus, was drawn down over the sutured incision.

Good approximation of the wound lips is best accomplished by the ab-externo approach rather than by the classical corneal section which was employed by one of us for many years prior to using the scissors section. It was found extremely difficult to place the section exactly where desired by the earlier method and, since this was regarded of primary importance, the scissors section was substituted.

A round-bellied Bard-Parker knife is used after fixation of the sclera with a Falcao fixation forceps. This instrument consists of two 1.5-mm. sharp prongs which are directly opposite each other, situated near the ends of the two blades of the forceps, and protected from quite meeting by a block higher up on the forceps. These are greatly superior to any fixation forceps that we know and are useful whenever scleral fixation is desired, for example in extraocular muscle surgery.

Incisions are made with a Bard-Parker knife at one mm. from the limbus in the cornea from the 2- to 1-o'clock positions and from the 11- to 10-o'clock positions. They should penetrate two thirds of the corneal depth and slant slightly anteriorly. The eye must not be inundated with free fluid at this point because refraction of the blade through this will prevent a true estimate of the depth of the incision and it is important that the entire incision shall be made with one cut of the knife.

A small curved needle with swedged-in 6-0 silk is introduced one mm. below each cut and brought out in the incision. It is then reintroduced in the incision exactly opposite the point of exit in the cornea and brought out one mm. above the incision.

The anterior chamber is entered with a cataract knife after the loops of the sutures are laid carefully to one side and a section only sufficiently large for the easy introduction of a Berens scissors is made. A full 180-degree incision is then completed using these scissors.

The lens is seized, taking a broad bite, about four mm. in width, beneath the iris at the 6-o'clock position with an Arruga forceps. There is no danger of rupturing the capsule by too wide a grasp. The forceps should previously have been bent to a concavity corresponding to the convexity of the anterior lens surface. This permits seizing the lens further down than if the shaft is straight.

On breaking the zonule and tumbling the lens, the heel of the forceps should be depressed while the forceps has been placed somewhat obliquely so that this procedure will not interfere with the delivery of the lens. By thus depressing the heel, the bite on the capsule does not lift the capsule and cause it to rupture at the moment of delivery as occasionally happens otherwise. These suggestions are made to avoid capsule rupture and the consequent probability of some cortex being left in the anterior chamber even after irrigation.

The technique of carrying the needle through the depth of the wound and bringing it out only once, namely on the scleral side, as advocated by Dr. McLean, was used for many cases. But it was found that the approximation was better using the technique described here. This probably was due to

some obliquity resulting from the difficulty in placing these sutures exactly at right angles to the incision when the needle was not brought out in the incision. Furthermore, the procedure here advocated is much simpler.

A possible method of accomplishing better closure might be utilization of some form of fibrin or fibrinogen. We, however, have not utilized this so cannot speak for or against it. Certainly if it would add to rapid coaptation of the incision, it might prove valuable.

Why prolonged choroidal detachment, which occurred in two cases, should take place is not clear to us—possibly undue trauma was exercised though no note of this was made at the time of surgery.

A case of wound infection is a great rarity. Excepting one case, which was apparently a stitch abscess, no infection had occurred for many years and this one remained extraocular.

Of nonsurgical treatment, the drug most successfully used was pilocarpine in strengths of two to four percent from two to four times a day; eserine (one percent) in castor oil was used where pilocarpine failed; and Doryl (1.5 percent) in zephiran, 1:5,000. DFP and prostigmine were also employed in rather intractable cases.

The following were the final tensions in the cases listed in this series: Tension, 30 mm. Hg (Schiøtz) or below, 21 cases or 60 percent; 31 to 40 mm. Hg, nine cases or 25.7 percent; 40 mm. Hg and over, five cases or 14.3 percent. Similarly, the visual results are listed. Final vision, 20/15 to 20/40, 16 cases or 45.7 percent; 20/50 to 20/100, seven cases or 20 percent; 20/120 to hand motions, four cases or 11.4 percent; and hand motions to no light perception, eight cases or 22.9 percent.

Obviously, the outlook is not too depressing in these cases of postoperative glaucoma since 60 percent of them had a final normal tension. By "final" in this series, we refer to no case observed for less than one year after the onset of the glaucoma. Another 25.7 percent had tension only moderately elevated. Even more important, the final vision in almost one half of the cases was 20/15 to 20/40, and in another 20 percent, 20/50 to 20/100.

Summary and Conclusions

Thirty-five cases of glaucoma following cataract extraction are cited.

The causes are outlined and methods suggested for eliminating these causes or treating them when they do occur.

Prognosis in glaucoma caused by cataract surgery is good under either medical or surgical management.

A preoperative tension should be taken with tonometer to be sure that glaucoma does not exist.

If complications have occurred, patients should be observed very frequently after operation to detect first signs of glaucoma.

It is presumed that the patient will be seen two months after surgery for the fitting of glasses. In addition, observation after six months and 18 months for postoperative glaucoma should be made in all cases even after uneventful cataract surgery.

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NOTES, CASES, INSTRUMENTS

SIGNIFICANCE OF BITOT'S SPOTS

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Bitot's spots are small, sharply defined areas in the conjunctiva, which are lusterless, are not wet by the lacrimal fluid, and are covered by a white foamy material. Usually, they are triangular in shape with their base at the limbus and their apex extending toward the lateral canthus. Nearly always they occur on the temporal aspect of the bulbar conjunctiva. The lesion, which is considered pathognomonic of vitamin-A deficiency, is due to a keratinization of the conjunctival epithelium.[1]

The peculiar foamy appearance is striking and probably represents accumulations of desquamating epithelium and Meibomian secretions adhering to an area of epithelial metaplasia. It can be wiped off readily with a cotton applicator but quickly reforms again. When it is wiped off a dry, wrinkled, irregularly elevated conjunctival mucosa is seen.[2]

Bitot's spots are usually considered a phase of xerophthalmia and, as such, a specific indication of vitamin-A deficiency. The spots appear after the onset of night blindness or concomitant with it, according to MacKenzie, Tassman, and others.[3, 4] If the avitaminosis A is not corrected, the xerosis of the conjunctiva progresses to xerosis of the cornea and keratomalacia, much more serious conditions, usually seen only in severely malnourished children.

Chemical and biologic methods of determining vitamin-A levels are unreliable. There is no absolute correlation between blood levels of vitamin A and other findings.[5] Tissue scrapings are not uniformly satisfactory. Dark-adaptation tests are slow, cumbersome, and reliable only with intelligent observers. The earliest and most reliable symptom is loss of visual acuity in dim light. This has been noted to precede formation of Bitot's spots in most cases.

CASE REPORTS

Two cases of Bitot's spots have been seen recently in young soldiers. One of these patients was an American Negro and the other a Puerto Rican. Neither soldier had any evidence of avitaminosis or malnutrition. They ate normal diets. They did not complain of night blindness on careful questioning. In each case they had bilateral temporal triangles of keratinized epithelium, covered by a foamy material and typical of Bitot's spots in all respects.

They were each treated with 30,000 units of vitamin A daily, which is considered adequate therapy for a deficiency state.[5, 6] One of them was followed for six weeks and the other for four weeks without change in the lesions. It is known that ocular signs of avitaminosis A clear rapidly on adequate therapy in both humans and rats.[5, 7]

Although improvement should have been expected under treatment, no change in the Bitot's spots was noted in either patient. These two cases apparently represent xerosis of the conjunctiva due to local tissue disease or to excessive exposure, rather than to vitamin deficiency.[1] The normal state of nutrition, normal dietary history, absence of night blindness, and lack of response to vitamin therapy all speak against the Bitot's spots being significant of vitamin-A deficiency in these two cases.

COMMENTS

These observations are in agreement with several previously reported studies. It has been observed that the presence of Bitot's spots in members of dark-skinned races living in tropical or semitropical environments is often seen without evidence of avitaminosis A.

Metivier reported that 56 out of 400 school children he saw in his Trinidad eye clinics had xerosis conjunctiva. These children had no night blindness and no clinical evidence of other vitamin deficiencies. None of these

cases responded to vitamin A, given in high doses over many weeks.

One child with Bitot's spots and night blindness, as well as signs of vitamin-B deficiency, was seen and he responded promptly to therapy.[4]

Metivier reviewed the literature and found reports of the same experiences by Palmer in Assam, Sie-Boen-Lian in Java, Aykroyd in India, Wilson in Egypt, and Nicholls in Ceylon. They all reported cases of Bitot's spots and other forms of xerosis conjunctiva that were resistant to vitamin-A therapy.[4]

It should be reiterated that these observations were made on natives from tropical countries. They were exposed to strong sunlight for many years. Many of them probably had been on inadequate diets for long periods of their lives. These and other factors apparently caused a form of xerosis conjunctiva which was refractory to treatment with vitamin A.

SUMMARY

Two cases of Bitot's spots without night blindness are reported in well-nourished young men. Neither case improved under vitamin-A therapy.

There are several reports of xerosis conjunctiva occurring in natives of tropical countries, in whom there was no response to vitamin-A therapy. The presence of Bitot's spots cannot be considered as indicative of vitamin-A deficiency in every case.

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A NEW GROUP OF CYCLOPLEGIC DRUGS*

FURTHER STUDIES

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My interest in a new group of cycloplegic drugs was stimulated by a report by Priestley and Medine[1] in 1951. Their report concerned itself with Compound 75 G.T.† We undertook a comparative study of the cycloplegic effects of this compound and two other related compounds of the same series, Compound 92 G.T. and 93 G.T.‡

These compounds are members of a series of new antispasmodic agents belonging to a class of basic esters of substituted phenylacetic acids, the structure and preparation of which are to be reported elsewhere. As will be shown, these compounds more closely approximate the ideal cycloplegic drug than any in common use at the present time. The ideal cycloplegic drug would be one possessing the following properties: (1) Rapid effect, (2) extensive depression of accommodation for a sufficiently long period as to permit adequate refraction, (3) prompt recovery, (4) dissociation of mydriatic and cycloplegic effect, and (5) no local or systemic side-reactions.

In this study the drugs were used in 0.5-percent concentration in a boric-acid borate

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† Schieffelin and Company, New York.

‡ Supplied through the courtesy of E. W. Blanchard, Ph.D., Director of Research, Schieffelin and Company.

TABLE 1

CYCLOPLEGIC EFFECTS

Compound G.T.	75	92	93
Average residual accommodation 1 hr. after instillation	80 cases 1.03D.	50 cases 1.0D.	50 cases 1.0D.
Residual accommodation by age groups			
10–20 years	28 cases 1.14D.	15 cases 1.03D.	21 cases 1.05D.
20–30	29 cases 0.97D.	19 cases 1.06D.	15 cases 0.95D.
30–40	23 cases 0.97D.	16 cases 0.88D.	14 cases 1.00D.
Range of residual accommodation (diopters)			
0.50	2.5%		
0.75	13.7%	26%	32%
1.00	55.0%	50%	46%
1.25	27.5%	24%	14%
1.50	1.3%		6%
1.75			2%

buffer, pH about 5.7, with 1:50,000 zephiran as a preservative. Two drops were instilled in the conjunctival cul-de-sac five minutes apart, refraction being done one hour after the initial instillation. The residual accommodation was measured, after correction of the distance refractive error, by determining the near point of accommodation. In no instance in this study of 180 cases was any evidence of general or local toxicity encountered.

Maximal cycloplegia was rapidly induced (within 30 minutes in some cases) and reached a maximum within 45 to 60 minutes. Restoration of accommodative power without the use of a miotic occurred usually between four and 12 hours. In a comparatively few cases the ability to read was delayed for about 24 hours. The recovery from the cycloplegic effect was considerably more rapid than that experienced with either homatropine or homatropine-paredrine combination where a delay of 24 to 48 hours is not too unusual.

The mydriatic effect was also rapidly manifested (often within 15 minutes) and maximal within 45 minutes. Recovery from the mydriatic effect was slower than from the cycloplegic effect, usually within 24 to 48 hours. No instance of increased intraocular pressure was found as the result of the mydriatic effect.

Table 1 demonstrates the cycloplegic effects of these three compounds. It is seen that the average residual cycloplegia for all cases is about one diopter. Particularly significant is the marked depression of accommodation in the age group of 10 to 20 years. The range was found to be from 1.03 diopters with Compound 92 to 1.14 diopters with Compound 75. In the other age groups the range was from 0.88 diopters to 1.06 diopters.

No direct comparisons of residual accommodation were made against homatropine-paredrine cycloplegia which has been our usual routine. However, it was found that, in many cases previously refracted with homatropine and paredrine in combination, the cycloplegic action with the drugs of this new series was either equal to or more profound than with the homatropine-paredrine combination. Figures taken from the papers by Marron[2] and Moncrieff and Scheribel[3] indicate a residual accommodation of 1.9 diopters with atropine and 1.6 diopters with homatropine. Our findings, as has been shown, indicate a considerably greater cycloplegic effect with this new series of drugs.

SUMMARY

The reported new compounds, Compounds 75 G.T., 92 G.T., and 93 G.T., offer the nearest approach to the ideal cycloplegic of

any drug now in use or recently reported. Their action is prompt (within 45 to 60 minutes for maximum cycloplegia), the accommodation is markedly depressed (average residual about 1.00 diopter), and the recovery is prompt (usually within four to 12 hours). These compounds depart from the ideal in their mydriatic effect which, however, is not objectionable when compared to the advantages indicated.

One of these compounds will soon be released for office use.* It is believed that these drugs may successfully replace, or will certainly be a useful adjunct, to the use of homatropine and even atropine for routine office refraction.

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*"Cyclogyl," Personal communication from Dr. E. W. Blanchard.

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EYE AND OTHER HANDICAPS*

THEIR RELATION TO PERFORMANCE ON A VISUAL MOTOR GESTALT TEST

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While using the Bender visual motor gestalt test in exploring personality factors among reading failures, some of whom had severe eye and visual defects, I questioned whether these handicaps were impairing the validity of the test. It seemed possible that visual-ocular difficulties might account for some inadequacy of perception of the gestalt configurations and that defects and deficiencies of the drawing arm, forearm, and hand might interfere with the reproduction of the pattern as perceived. In such cases the test would be detecting physical defectiveness as well as personality factors.

Fifty persons, who were reading failures and who had been given the Bender test, were examined for vision, refraction, binocular vision, the speed of object perception, lateral dominance of eye and hand, and defects of the drawing arm, forearm, and hand. The median age of the group was eight years, four months and the median intelligence quotient was 100. As usual, among reading failures, 80 percent were boys and 20 percent were girls.

Visual measurements were made with the refractive correction in use and refractive errors were counted present only when they were of one diopter or more. For the sake of simplicity, muscular imbalances, fusion deficiencies, suppression, and so forth were grouped together as "defects of binocular vision." The speed of object perception was measured according to the method previously described by me.[1,2]

The Bender test[3] consists of the presentation of nine cards, one at a time, each having a gestalt figure on it. The individual under test is instructed to copy each of the designs as he sees it. Interpretation is not specific with right and wrong answers, as in the case of most intelligence and achievement tests. Instead the examiner studies the subject's drawings, classifies their characteristics under fairly flexible headings, and interprets them in the light of his knowledge of gestalt principles, personality dynamics, and maturational level.

The present study compares the frequency

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TABLE 1

FREQUENCY

Characteristic	Amblyopia (percent)	Hypermetropia (percent)	Myopia	Defects of Binocular Vision (percent)	Speed of Object Perception (percent)	Lateral Dominance Variation (percent)
Fragmentation	50	28	0	28	17	46
Rotation	28	8	0	15	12	35
Simplification	64	41	0	28	0	50
Elaboration	43	29	0	29	14	75
Coördination	54	7	0	35	7	57
Heavy lines	33	17	17	30	30	10
Light line	too few					
Large figures	36	9	9	18	9	50
Placement	6	4	0	2	0	0

TABLE 2

RANK

Fragmentation	Amblyopia	Lat. dom. var.	Def. bin. vis.	Hypermet., & sp. obj. perc.
Rotation	Lat. dom. var.	Amblyopia	Def. bin. vis.	Sp. obj. perc., hypermet.
Simplification	Amblyopia	Lat. dom. var.	Hyperm.	Def. bin. vis.
Elaboration	Lat. dom. var.	Amblyopia	Hyperm. & def. bin. vis.	Sp. obj. perc.
Coördination	Lat. dom. var.	Amblyopia	Def. bin. vis.	Hypermet.
Heavy line	Amblyopia	Def. bin. vis. & sp. obj. perc.	Hyperm.	
Large figures	Lat. dom. var.	Amblyopia	Def. bin. vis.	Hypermet,. myopia, sp. obj. perc.
Placement	Amblyopia	Hyperm.	Myopia, sp. obj. perc.	

of the various defects considered, as they occurred among those whose drawings exhibited certain characteristics, including: (1) Fragmentation, (2) rotation, (3) simplification, (4) elaboration, (5) coördination, (6) quality of line, (7) size of figures, and (8) placement on the paper.

Allowances were made for the maturational level of each child. The frequency table (table 1) presents these figures, while the rank table (table 2) gives the conditions found in order of descending frequency for each of the various characteristics studied.

The most striking thing appears to be the high frequency of dominance variation and amblyopia. Taking 50 percent or over as a range of significant frequencies, one finds amblyopia associated with fragmentation, simplification, and coördination difficulty; while lateral dominance variations appear with simplification, elaboration, coördination difficulty, and the production of large copy. No significantly high frequency of defect occurred among those whose placement was scattered or crowded or whose drawings overlapped.

It is to be pointed out, of course, that co-existence of two factors (such as fragmentation and amblyopia) does not prove that either causes the other but it appears significant that certain conditions do appear to accompany certain characteristics in a relatively large number of cases.

No child exhibited deformity or weakness of the drawing arm, forearm, or hand. Left-handedness occurred in 25 percent of those who displayed elaboration and those who made heavy lines. There was a comparable incidence of left eyedness in the same groups, which may point to a possible relationship of general left-dominance to performances of these kinds.

It is concluded that the relationship of amblyopia and dominance variations to the

production of gestalt configurations in a test of the kind discussed here merits further investigation.

Users of such tests should attempt to evaluate the subject's drawings in the light of the ocular condition. While the frequency of defects of the drawing arm, forearm, and hand was zero and that of hand-dominance variation relatively low, it seems not unlikely that such factors should be taken into account when they occur.

SUMMARY

Fifty reading failures were studied as to the frequency of visual and manual defects and variations among those exhibiting certain characteristics in copying the gestalt configurations in a visual-motor test. The possibility of some relationship of amblyopia and lateral dominance variation to test performance is suggested.

264 Beacon Street.

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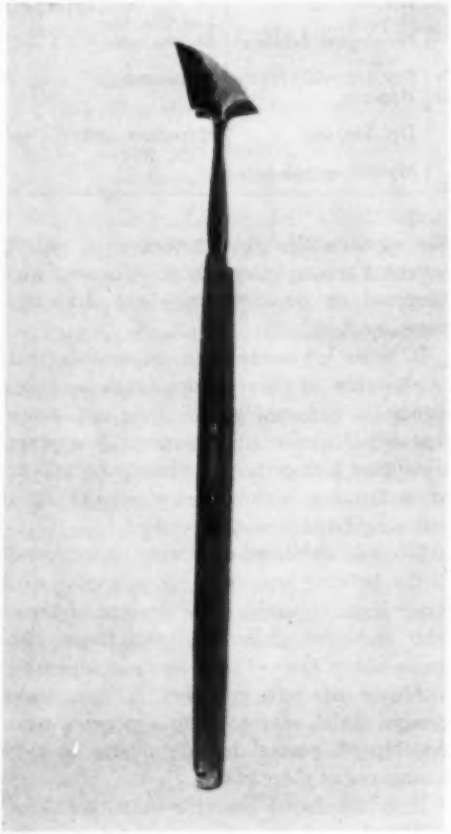

Fig. 1 (Harrison). The oblique-angle keratome.

THE OBLIQUE-ANGLE KERATOME*

WILLIAM J. HARRISON, M.D.
Philadelphia, Pennsylvania

There have been times in intraocular surgery when the anterior capsule of the lens has been unintentionally punctured with the point of the keratome. More often this accident has resulted from the poor coöperation of the patient or has been due to a shallow anterior chamber.

To avoid this distressing complication, I have devised a keratome in which the point is at an oblique angle from the shaft. When introduced in the usual manner, I have found it physically impossible to invade the pupillary area with the point of the keratome.

135 South 17th Street.

* This instrument may be obtained in two sizes from the E. B. Meyrowitz Surgical Instruments Co., Inc., 520 Fifth Avenue, New York 18, New York.

MALIGNANT MELANOMA OF THE IRIS*

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Huntington, West Virginia

Malignant melanoma of the iris is an uncommon occurrence. A review of the literature reveals approximately 200 such cases recorded since the time of Laennec (1819). Duke-Elder, Doherty, Wilder, Richardson, and others have reported upon this fact and isolated cases dot the literature at infrequent intervals. That this tumor is not typical of malignant melanoma is now well established. The cell types do not always fall into the usual pattern and the mortality rate is much lower. The theory that nevi are precursors to the growth is heard much more frequently and the lower mortality rate has been attributed to the fact that the neoplasm is visible early.

Fuchs, in 1882, discussed malignant melanoma and reached conclusions which are still basic today. He stated that 85 percent are found in the choroid, nine percent in the ciliary body, and only six percent are found in the iris. This ratio has been accepted up to this writing.

Although the malignant melanomas of the iris do not show strictly the same findings as malignancies in the choroid and ciliary body, they are still considered to behave similarly. Like sarcomas, they metastasize by way of the blood stream to the liver, lung, brain, and then, generally, to the entire body.

The origin of these neoplasms is still a matter of much controversy. Following the work of Masson, Frick, Laidlow, and Murray, and in 1937 of Theobald, the neurogenic theory is at present most acceptable. Reese and Wolff have postulated cell origin. The presence of oxidase, "dopa" substance, the melanoma at the nerve ending, benign growths along the sheath of Schwann, and the multiplicity of the cell type at the metastatic lesion point toward the neurogenic origin.

In the iris, the tumor has been described as either circumscribed (more common) or diffuse (more rare).

The circumscribed type starts at the root of the iris or at the ligamentum pectinatum iridis and grows rapidly. The diffuse type begins in the deeper layers of the iris at the root, slowly spreading through the stroma to the major arterial circle and a diffuse growth until it reaches the angle and the canal of Schlemm, producing secondary glaucoma. If this growth continues around the iris, it becomes the rare, so-called diffuse ring or annular malignant melanoma of the iris.

The neoplasm occurs more commonly in women and usually at a much younger age than malignant melanomas of the choroid and ciliary body. It has been found between the ages of 10 and 70 years but more commonly in the third and fourth decades. Because of the wide metastatic spread of this neoplasm during pregnancy, it is urged by Pack that women patients be cautioned against pregnancy for from three to five years after removal of the tumor.

There is no diagnostic symptomatology for these neoplasms. They are visible early and should be removed as soon as possible after observation. Reese and other investigators have noted that no matter how small, they metastasize early. Secondary glaucoma commonly occurs when the cells block the chamber angle and produce a mechanical stoppage there. This glaucoma is often mistaken for a primary condition.

The differential diagnosis involves the consideration of inflammatory granulomas such as tuberculosis, syphilis, leiomyoma, cysts, and nexi. Often the final diagnosis, however, is made after iridectomy at the laboratory.

In treatment, iridectomy is the procedure of first choice if the lesion is small, readily visible and the chamber angle not involved. When the lesion is large, filling the chamber

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* Presented before the West Virginia Academy of Ophthalmology and Otolaryngology, White Sulphur Springs, May, 1952.

Fig. 1 (Esposito). Malignant melanoma of the iris.

angle, or a secondary glaucoma is present, or the iridectomy did not completely remove the mass, enucleation should be done. The tumor is radio-resistant and radiation therapy has little, if any value here.

The prognosis in malignant melanoma of the iris is not bad. Wilder reports a mortality rate of 9.4 percent in one series which is in keeping with the general average of 10 percent. This is in direct contrast with the deaths in malignant melanomas of the ciliary body and choroid where the incidence rests at 48 percent at the end of five years and 66 percent at the end of 10 years.

Case reports

Case 1

A school teacher, Mrs. K. M., aged 28 years, was first seen on March 4, 1949, with the history of "something being wrong with her left eye." She had first noticed this "spot" on her iris about two years ago, had consulted an optometrist and had been told that it was "an old hemorrhage."

This area had increased in size steadily, changed color, and then suddenly she had an actual anterior-chamber hemorrhage with blurred vision one week prior to this visit. She also had begun to "spit up blood" and was frightened.

The appearance of the eye was as noted in Figure 1. The mass filled the entire area of that portion of anterior chamber to the posterior corneal surface; it was solid, brownish in color, and no evidence of anterior-chamber hemorrhage was noted.

Uncorrected vision was 20/20 and the intraocular pressure was normal bilaterally. The pupil did not dilate in the involved portion of the iris. The media and the fundus were normal.

A diagnosis of malignant melanoma of the iris was made, she was advised of the seriousness of the condition, and it was recommended that the eye be enucleated immediately.

X-ray studies of the skull, chest, and long bones were taken but showed no metastatic lesion. Chest films were negative for tuberculosis and no reason could be found for her "spitting up blood."

Because of the rarity of this condition, several Huntington ophthalmologists examined this lesion prior to surgery and concurred in the diagnosis and recommendations. She entered Saint Mary's Hospital and the eye was enucleated (with implant) on March 21, 1949.

Fig. 2 (Esposito). Section of the globe, showing the tumor mass filling half of the anterior chamber.

The pathologic report (Dr. S. Werthammer) follows:

Gross. An adult globe measuring 23 mm. by 24 mm. Through the cornea, a gray-brownish growth is visible involving almost one third of the iris, and filling that portion of the anterior chamber to the cornea.

Microscopic. Figure 2 shows a dark-staining circumscribed mass involving the iris tissue and extending from the iris root to the pupillary border and filling that portion of the anterior chamber completely to the endothelial layer of the cornea (fig. 3). The chamber angle was involved (fig. 4) with cells appearing in the angle and the canal of Schlemm.

The tumor involved the entire iris and filled the space to the corneal endothelium and was made up of fascicules of neoplastic cells (figs. 5 and 6) with many containing pigment. The cells are spindle-shaped and epithelioid, showing nuclei with distinct nucleoli and mitotic figures. The fiber content is less than 50 percent by Wilder technique.

Fig. 3 (Esposito). Low-power view of the cornea with the melanoma lying in apposition.

Fig. 4 (Esposito). The chamber angle.

Diagnosis (X14-8852). Malignant melanoma of the iris, mixed type (Spindle B and epithelioid). Fiber content less than 50 percent. Pigment content, medium.

This patient has been seen by her family physician at two-to-three month intervals and has been warned not to become pregnant until approximately three to five years after surgery. The patient, up to this time, has shown no evidence of metastatic spread.

Case 2

I saw Miss K. R., aged 19 years, white, on April 21, 1952. This case will be reported fully for the literature by Dr. Carl Breisacher of Charleston, West Virginia, at a later date.

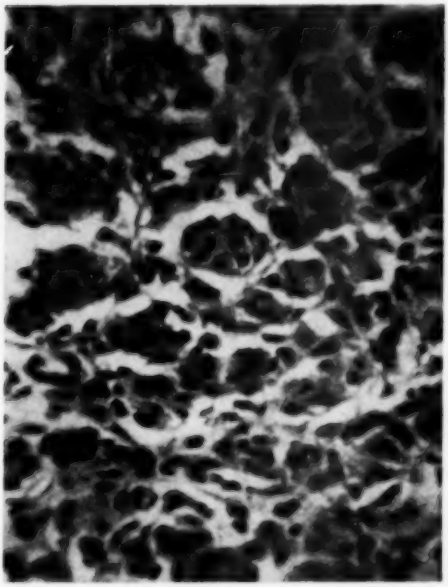

Fig. 5 (Esposito). High-power view of the tumor cells, showing occasional pigment.

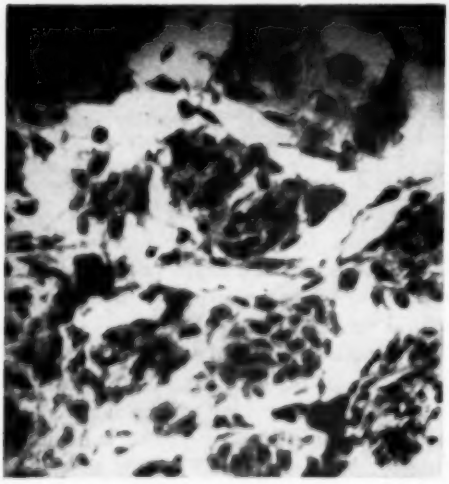

Fig. 6 (Esposito). Oil immersion of iris section, showing cells, pigment, and some fibers.

She gave a history of sudden anterior-chamber hemorrhage two weeks ago.

Examination revealed a horny, brownish growth in the anterior chamber projecting from the iris at the chamber angle at the 4-o'clock position. Adjacent to this were two suspicious-looking areas, suggesting the possibility of a diffuse growth in the iris. I made a diagnosis of malignant melanoma of the iris, as had Dr. Breisacher. One week later biopsy and subsequent enucleation (in Charleston, West Virginia) confirmed the diagnosis.

Discussion

In the cases presented, the tumors were both of the circumscribed type which seems to be more readily diagnosed than the diffuse type which can simulate an iridocyclitis. In neither case was glaucoma present, although in Case 1 the involvement was extensive as the photomicrographs note. Both cases were in young women and, as noted, their ages were in the second and third decades, much earlier than the usual age for this malignancy to appear in the posterior segment of the eye. Of interest was the occurrence of a sudden anterior-chamber hemorrhage which brought both of the patients in for medical attention. Pack's warning of the rapid dissemination of the tumor during pregnancy is of special interest here and both patients have been so advised.

Summary

A brief review of malignant melanoma of the iris has been presented with two case reports and illustrations of the first. This tumor rarely occurs in the iris and when it does has a lower mortality rate than when occurring in the ciliary body and choroid. It has, however, the same terrible potentialities.

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RUBBER-BASE CEMENT FOR FIXATION OF EYE SHEETS FOR SURGERY*

OSCAR DAHLENE, JR., M.D.
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The purpose of this report is to describe a procedure for good fixation of the eye sheet in surgery and for eliminating the annoying shadows cast by the elevated or displaced margins of the hole in the sheet. This method had been used over 75 times in the past four months for intraocular and extraocular surgery, and has proved most satisfactory for fixing the eye sheet.

The adhesive, a rubber-base cement of the type employed in operation of the Padgett-Hood dermatome, is available from surgical supply houses. Handled aseptically as any other solutions for use in surgery, it is kept in a small, wide-mouthed, screw-top jar so that about an ounce of the mixture is ready for use at all times.

Normal precautions to insure freedom from external contamination are necessary. Although the mixture is antiseptic because of the high ether content, several cultures were taken for confirmation. Cultures taken from properly handled cement have been sterile.

The cement should be thin enough to run freely from an applicator stick, yet have some body. The thick liquid from the stock can is diluted with about an equal amount of ether before it is poured into the small bottle for daily use.

The operative field is prepared in the usual manner. The area where glue is to be applied is then allowed to dry by evaporation or is dried by a sterile gauze pad. The injections for akinesia of lids and globe may be made before the eye sheet is placed over the patient.

With a sterile, cotton-tipped applicator, a line of glue 0.5 to 1.0 cm. wide is painted from the glabella along the bridge of the nose, the side of the nose toward the operative side, and on the malar ridge below. A small amount may also be painted above and below the eyebrow if necessary.

The cement is allowed to dry until enough ether has evaporated so that it is sticky, then the hole in the sheet is centered over the eye and the edges are pressed along the painted area for 15 to 30 seconds until they adhere. No cement need be put on the eye sheet.

Following surgery, the sheet peels off easily, and very little cement is in evidence on the patient or the sheet. Any residual adhesive may be removed easily from the skin at once or at the first dressing by rubbing with a finger tip or a piece of gauze.

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SOCIETY PROCEEDINGS

Edited by DONALD J. LYLE, M.D.

NEW YORK SOCIETY FOR CLINICAL OPHTHALMOLOGY

February 4, 1952

DR. SAMUEL GARTNER, *president*

URTICARIA OCCURRING DURING PARENTERAL ADMINISTRATION OF CORTISONE

DR. ABRAHAM SCHLOSSMAN said that an instance of urticaria occurred during the parenteral administration of cortisone acetate in a 70-year-old patient. The patient had had a bilateral iridencleisis for chronic simple glaucoma.

He developed bilateral uveitis which was feared to be sympathetic ophthalmia. Consequently, parenteral cortisone was administered in maximal doses and, after he received a total of 2,000 gm. of cortisone over a period of 13 days, he developed an urticarial eruption.

This was interpreted as an allergic response to one of the excipients in the parenteral preparation rather than to the cortisone acetate itself. The urticaria subsided when the cortisone was discontinued.

The patient, however, tolerated the preparation locally in the conjunctival sac as eyedrops, during and after the systemic reaction.

Discussion. Dr. von Sallmann said that he had one patient who reacted to parenteral cortisone. He developed a fever right after the injection, which was considered to be allergic. Dr. von Sallmann said that he had also seen one or two other patients with allergic reactions to cortisone.

Dr. Theodore asked Dr. von Sallmann whether these patients could tolerate ACTH? Dr. von Sallmann replied that ACTH was not tried.

Dr. Kestenbaum said that he saw a patient, with edema of the legs following cortisone, who subsequently died. He said he did not know for certain whether this was an allergic response.

Dr. Kronenberg asked Dr. Kestenbaum whether the patient's salt metabolism was controlled.

Dr. Kestenbaum replied that the salt metabolism was controlled.

SCLERODERMA WITH RETINOPATHY

DR. HOWARD J. AGATSTON reported the case of a 46-year-old woman whose history was negative except for a mild chronic cholecystitis and uterine fibromyomas. There was a gradual onset of generalized scleroderma four months after cholecystectomy and panhysterectomy. Skin biopsy of the dorsum of the hand confirmed the clinical diagnosis.

Retinopathy was first noted one year after onset of the scleroderma and consisted of three fluffy, white, superficial exudates near the left optic disc. Retinal arterioles were normal in caliber and there were no retinal hemorrhages. (The blood pressure was normal.)

The eyelids were thickened and woody to touch. Some lagophthalmos was present. Slitlamp examination failed to disclose any lenticular opacities.

Cortisone, ACTH, and pranturon were tried; there was no influence on the scleroderma. They were tried after the onset of the retinopathy; whether they influenced the ophthalmoscopic picture is not known. Reexamination of the fundi showed reabsorption of the original exudates but several fresh exudates and groups of exudate residues were noted in the central retina of each eye. No hemorrhages were present and the caliber of the arterioles was within normal limits.

The patient died one and a half years after onset of the scleroderma in sudden cardiac

decompensation. Autopsy was not obtained. Urine examination done three weeks before death revealed many red blood cells per high-power field and 4+ albumin.

Retinopathy occurs with regularity in diseases which affect the renal glomeruli: for example, glomerulonephritis, malignant nephrosclerosis, Kimmelsteil-Wilson syndrome, lupus erythematosis, and periarteritis nodosa. It may occur in dermatomyositis when the kidneys are involved. In other words, many diseases affect renal and retinal capillaries at the same time. Since glomerular lesions are common in scleroderma, especially late in the disease, one might anticipate the occurrence of retinopathy.

Discussion. Dr. Gartner said that 12 years ago he had presented a paper on Werner's syndrome, which consists of scleroderma with cataracts and which is familial in incidence. He also remarked that scleroderma may be associated with other eye findings: for example, scleroderma with keratoconus.

Dr. Givner said that Dr. Agatston's case is, as far as he knows, the first case to show retinal lesions which are related to scleroderma. He said that he believed that other reported lesions of drusen, chorioretinitis, and so forth are coincidental. Dr. Givner said that he saw the case presented when the exudate was present. It was in the nerve-fiber layer, similar to that seen in acute lupus erythematosus. Being one of the collagen diseases, one might have predicted the eventual finding of such a lesion in this disease.

Frank and Levitt mention X-ray findings of the chest showing exaggerated perivascular markings with peribronchial infiltration as being not unusual in scleroderma. They mention Popkin's work in administering hyaluronidase by iontophoresis (hyaluronic acid has a role in the formation of collagen) to two patients on the assumption of a disturbance in the hyaluronidase-hyaluronic acid system in scleroderma and obtained clinical improvement. On the other hand, an inhibitory effect by corticosteroids upon the activity of hyaluronidase has been demonstrated. Results indicate that cortisone and ACTH produce symptomatic improvement in scleroderma in spite of their antihyaluronidase effect.

Dr. Kronenberg asked, since the patient had renal disease, why are the fundus findings different from ordinary renal disease?

Dr. Agatston said that the patient's blood pressure had always been normal until one month before his death. He said that the three exudates disappeared and he never had any hemorrhage. Several patients treated with cortisone improved temporarily. One case developed cerebral encephalitis several weeks after treatment was instituted. He suggested that cortisone might be effective in some collagen diseases but not in all.

Parinaud's oculoglandular syndrome (leptothrichosis) treated with chloromycetin

Dr. George Z. Carter presented the case of an 11-year-old girl with this syndrome, who first appeared at the Newark Eye aand Ear Infirmary in October, 1951. She complained of painless swelling and heaviness of the right upper lid of 10 days' duration. Seven days previous to this first examination, she also noticed tender swelling in front of her right ear and on the right side of the neck. She had never had this condition previously.

Ophthalmic examination revealed the vision to be 20/20 in each eye. External examination showed considerable edema and pseudoptosis of the upper lid with scanty discharge accumulated at the inner canthus. The skin surrounding the eye was normal. The preauricular gland was visibly swollen and tender. There was slightly tender swelling of upper cervical glands along the anterior margin of the right sterno-cleido-mastoid muscle.

The bulbar and lower palpebral conjunctiva was normal except for a number of small follicles in the outer third of the lower

fornix, surrounded by slight edema and congestion. The upper tarsal conjunctiva displayed a number of small, rounded, raised pink and yellow nodules. The cornea was clear except for three small areas of pale gelatinous swelling overhanging the corneal margin. The left eye was entirely normal, as were the left preauricular and cervical lymph nodes.

History revealed that the patient had played with a stray cat four days previous to the onset of the eye condition. Therefore, a diagnosis of Parinaud's oculoglandular syndrome was made. General physical and X-ray examinations were negative. Treatment was instituted with chloromycetin. Four days following beginning of this therapy, the patient's condition improved. By the seventh day the lesions of the conjunctiva had completely disappeared.

Laboratory reports confirmed the diagnosis of granulomatous conjunctivitis; but no etiologic agent was found.

Discussion. Dr. Fread asked how the chloromycetin was given, to which Dr. Carter replied that it was given orally.

Dr. Givner asked whether scrapings showed anything, and Dr. Carter answered, no.

Dr. Theodore made the following remarks about this case: (1) History of the patient shows that she played with a cat and that the cat licked her eye; (2) in most cases of this syndrome, the condition lasts longer, therefore the chloromycetin must have helped; (3) corneal lesions are most unusual in this condition.

Giant retinal tears without detachment

Dr. Frank H. Graupner presented three cases of retinal tears without detachment. The first case was that of a 50-year-old man who saw a veil suddenly over his left eye. A rather severe vitreous hemorrhage made observation difficult. Through this haze a large retinal flap was seen hanging down and floating in the vitreous. It was about five disc diameters in size. From the 10- to 12-o'clock positions, a fine semicircular line was seen, representing the edge of the still adherent retina. Two blood vessels ended abruptly in this line. The periphery of this eye was conspicuous for its degenerative changes.

The second case was that of a 68-year-old man who, three weeks prior to examination, had suffered a severe vitreous hemorrhage for which he was treated. A flap of retina hung down in a similar fashion as in the first case. The edge of the retinal tear was curled in; several vessels were interrupted by the tear and one still showed a bloodclot. There were two smaller retinal holes below, the operculum swimming in the vitreous. He could observe white silver lines like wires reaching from the floating flap into the vitreous.

As in the previous case, a nonperforating electrocoagulation of the sclera over the tear was performed. In the course of healing the flap disintegrated and was gradually absorbed.

The third case was that of a 67-year-old man who suffered a severe vitreous hemorrhage, which lasted over a year. Due to repeated hemorrhages observation was impossible. As the vitreous became clearer a large retinal flap could be observed. An electrocoagulation was performed.

Dr. Graupner summarized the characteristics of these cases: (1) There is a severe vitreous hemorrhage, which leads the patient to seek medical attention. (2) The reason for this hemorrhage is a tear in the inner layers of the retina; there is no retinal hole. (3) The formation of large cysts are found in more advanced retinal degeneration. (4) In several cases of smaller holes, the area of the tear and even the operculum showed pigmentation after the tearing took place, as early as two to three weeks.

The cause of the tears in the retina has long puzzled opthalmologists. Dr. Teng, after studying a large number of normal eyes, has found that cysts in the periphery are fairly common. Dr. Graupner expressed the belief

that such cysts in the periphery may rupture, thus causing the retinal tears.

Discussion. Dr. Katzin praised the work of Dr. Teng. He mentioned a paper published in the AMERICAN JOURNAL OF OPHTHALMOLOGY which reported that a large number of eyes of young people who died of trauma were examined, and showed peripheral cystic degeneration. In these cases the degeneration was not as far advanced as that of patients with vitreous hemorrhage, such as is seen in clinical practice. The majority of the holes seen did not extend through both layers of the retina. This, Dr. Katzin felt might explain why some cases of retinal holes do not detach. Horseshoelike tears usually go through and through and cause detachment. Round holes involving only one layer do not detach.

Dr. Goldschmidt said that, in one case he saw, the question was whether to operate or not. This patient had a retinal hole; he operated and had a good result. In a similar case, he did not operate and the patient still has the hole, but has not developed any detachment or hemorrhage. He raised the question of whether or not these cases should be operated.

Dr. Vesey said that in his opinion retinal tears do not necessarily become detachments. He felt that tears do not cause detachments, but that detachments are caused by other factors. This is particularly true in young patients.

Dr. Posner asked if there is anything in embryology related to this subject.

Dr. Kornzweig replied that the folds of Lange persist in newborn eyes sometimes and, if they do not become flattened, they may later in life become cystic.

Dr. von Sallmann said that, in the first case presented, he thought he had seen a tear at the edge of the operculum. This would argue against Dr. Graupner's theory. Of course, it is impossible to judge on the basis of examination of slides.

Dr. Graupner closed the discussion. To Dr. von Sallmann he said that he had examined the vitreous with the slitlamp, and it appeared very much liquefied. In the first case, the edge of the retina was slightly raised—the patient walked about with it for two weeks—and did not have the usual detachment. In other cases, strings of vitreous attached to the flap probably cause rupture of the cyst.

As regards the question of surgery, in cases with a hole in the retina without detachment, but preceded by hemorrhage in the vitreous, one must decide one way or the other early in the case, whether to operate or not.

Does hole cause detachment? Dr. Graupner said that opinion was divided. He personally had seen six cases of small holes with no detachment which he had watched for years. Small tears usually don't progress. Giant tears certainly should be operated. In cases with history of detachment in the other eye, even small tears should be operated to prevent detachment.

GLAUCOMATOUS CYCLITIC CRISES

Dr. Abraham L. Kornzweig presented the clinical history of a 40-year-old woman (at time of first examination, 1942). She had an attack of acute glaucoma in the left eye, for which an iridectomy was performed, with good results. However, following the operation, she again began to have attacks of increased tension, blurred vision, and discomfort in the left eye, which came on as often as three or four times a year, in spite of the initial operation. These attacks were usually associated with the presence of cells in the aqueous and a few deposits on Descemet's.

She responded, usually, to the treatment that was instituted, whether it was pilocarpine (two percent) or atropine (one percent), or foreign protein.

This patient was followed for a period of 10 years, during which time the attacks were noted to occur at irregular intervals and lasted anywhere from several hours to

two weeks and were always of the same type of reaction.

During 1947, she was subjected to a complete allergic workup. Several elements in her diet were changed. She was given injections for ragweed and grasses. Following this period of treatment, her attacks seemed to lessen in severity and frequency, though they still continued up to the time of the last examination in 1952.

This case was presented because it fits in with the group of cases called "glaucomatous cyclitic crises." The interesting fact is that these attacks occurred in spite of operation, but seemed to have been helped by treatment for some allergic conditions.

Discussion. Dr. Theodore said that he believes that this condition is a definite entity and that credit should be given to Dr. Posner and Dr. Schlossman for their work in delineating it. If ophthalmologists become aware of this condition, they would save needless surgery. Billett reported a case similar to Dr. Kornzweig's, which was published in the AMERICAN JOURNAL OF OPHTHALMOLOGY (**35**:214 (Feb.) 1952). In the last seven months the patient has been on cortisone and has had no attacks.

Dr. Givner said that he felt that there is no question that this is a definite entity.

Dr. Posner said that the cause of this entity is unknown. It may possibly be related to allergy, and cortisone may be effective because of the allergic nature of this condition. The fact that the tension goes up does not mean that vitreous fluid is the cause. It may be caused by transient fluid from other tissues. This is not a question of drainage or the usual physiologic changes associated with glaucoma. Dr. Posner said that Dr. Chandler believes that, in cases of acute primary glaucoma without narrow angle, one should wait for the keratic precipitates to disappear.

Dr. Kornzweig said that an allergist had suggested that this might be a case of angioneurotic edema of the eye.

BILATERAL OPTIC NEURITIS SIMULATING PAPILLEDEMA

DR. MAX CHAMLIN said that, in attempting to differentiate optic neuritis and papilledema on the basis of the funduscopic appearance alone, certain difficulties may be encountered. In attempting to make this differential diagnosis, other criteria must be used. Two of these are the laterality and the visual acuity. Papilledema is usually bilateral, and visual acuity, as a rule, is undisturbed in the early stages. In optic neuritis, on the other hand, the picture is usually unilateral, and central vision is usually markedly impaired.

Dr. Chamlin presented a case in which there was a sudden onset of some blurring of vision in both eyes of a middle-aged man. Ophthalmoscopically, there were hemorrhages, edema, and complete blurring of all margins in both fundi. However, visual acuity remained 20/20 in each eye.

Visual field studies showed nerve-fiber bundle defects in both eyes, starting at the blindspot and skirting around fixation, and ending on the nasal side. The nerve-fiber bundle defects skirted around but spared fixation and, therefore, visual acuity of 20/20 was preserved.

Because of the bilaterality of involvement, and the preservation of 20/20 vision, and the appearance of the discs, the patient was thought to have papilledema, until the visual field studies were plotted, and the diagnosis of optic neuritis was made.

Discussion. Dr. Kestenbaum said that the diagnosis of papilledema is often made in cases in which there is no papilledema. He himself has reported nine such cases, one was bilateral—that of a child with papilledema of four diopters, who was almost completely blind. Later, Dr. Kestenbaum said, he found that the condition started with a central defect. The child was prepared for a tumor operation; the neuritis subsided and normal vision resulted. It is important to discriminate between these two conditions. Papil-

ledema causes enlargement of the blindspot, never scotomas such as presented.

Bernard Kronenberg,
Recording Secretary.

OPHTHALMOLOGICAL SOCIETY OF MADRID

March 14, 1952

Intraocular foreign body

Dr. Marin-Amat presented a patient, a laborer who, while chopping firewood with a pickaxe, received a small injury in his right eye. He felt some pain but paid no attention to it for two days when he noticed complete loss of vision, whereupon he went to see a doctor who sent him to Madrid for consultation. It was then 10 days after the injury.

Externally, the eye seemed normal but vision was completely lost. There was a small cutaneous cicatrix in the upper lid, corresponding to another in the upper-inner quadrant of the globe, in front of the equator.

Ophthalmoscopy showed three or four strands of fibrin in the anterior part of the vitreous which stretched from the scleral cicatrix almost to the depth of the vitreous cavity, where they terminated in a small blackish body which appeared to be a blood clot. The papilla, the choroid, the retina, and the vitreous showed an intense inflammatory reaction, and the iris was slightly yellowish. Below the blood clot floated a metallic particle. The radiographs were positive.

Extraction of the particle was made with the giant electromagnet introduced into the vitreous, and a complete cure resulted with vision of 6/6 (1.0D) 10 days after the operation.

Discussion. Dr. Mario Esteban in discussing the paper said that in general, in removal of a foreign body from the anterior portion of the eye, the anterior route is preferable. For foreign bodies situated in the posterior portion of the eye, extraction by the posterior route is preferable.

A foreign body situated behind the iris is best removed through the sclera rather than through the cornea, as the former procedure is safer. One thus avoids wounding the iris or the crystalline lens and prevents the movement of the foreign body toward the ciliary processes. In a word, the operation is easier and safer.

He recommends that before incising the sclera one should use electrocoagulation of the outer surface in order to prevent possible hemorrhage or a detachment of the retina as a result of the surgical intervention.

Dr. Marin-Amat in conclusion said that anatomic topography determines the proper channel for removing intraocular foreign bodies. Those situated in the crystalline lens or in front of it should be removed by the anterior route, those situated in the vitreous by the posterior or scleral route.

Joseph I. Pascal,
Translator.

Ophthalmic Miniature

It was decided in the month of June 1920, to try the effect of partially blocking the facial nerve before such patients (cataract) were brought into the theatre, thereby putting the orbicularis temporarily out of action. It was determined to do this with the local anesthesia in ordinary use, namely 2% novocaine. The needle was entered over the center of the zygoma and following the line of the latter was pushed to the pinna.

R. E. Wright, American Journal of Ophthalmology, **4**:445, 1921.

(Also: Arch. Ophth., **55**:555, 1926.)

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SALUTE TO VIENNA

To hundreds of American ophthalmologists the description of the Vienna School of Ophthalmology to be found elsewhere in this issue will be provocative of nostalgic memories. Prior to the Anschluss in 1938, Vienna had been the Mecca for ophthalmologists throughout the world, particularly for those from the United States. Our own facilities for didactic instruction, now expanded into basic courses in numerous institutions, were then in an early embryonic state. A trip to Europe was, therefore, almost imperative to add luster and glamor to postgraduate study, residency, or preceptorship obtained at home, and indeed there were many whose entire specialty training was thus obtained.

There were several reasons why Vienna was the world's most popular center for training in ophthalmology. The names of Beer, Arlt, Jäger, Stellwag, and, in the 20th

century, those of Fuchs, Dimmer, Salzmann, Meller, and Lindner were magnetic to the eager young ophthalmologists for whom Fuchs's *Textbook* was the Bible of ophthalmology.

Prof. Ernst Fuchs had given the first course in English in 1879 and, following his example, several other famous Viennese professors presented independent courses in various fields of medicine for English-speaking physicians. This led to the formation of the American Medical Association of Vienna in 1904. After the first world war, during which it had necessarily been dormant, the association was re-organized in 1921. Between 1921 and 1938, it is claimed that over 11,800 physicians from English-speaking countries attended University of Vienna courses arranged through the Viennese A.M.A.

Headquarters over the Cafe Edison on Alserstrasse served not only as a meeting place but as a central body through which courses were organized in all branches of medicine, usually in English, at a standard rate per hour of instruction. Austrian impoverishment following the first world war had made this not an unimportant source of revenue for the younger instructors and many of those more fortunately situated were willing to add to their prestige by conducting classes for their American colleagues. In addition, for several years beginning in 1921, a special intensive course in ophthalmology, not under Viennese A.M.A. auspices, was presented by a distinguished faculty and known as the Fuchs course.

It is interesting to note that the American Medical Association of Vienna, disbanded with the entrance of Hitler into Austria, has recently again been revived under the name of the American Medical Society of Vienna, the change in name having been made to avoid confusion with the A.M.A. of the United States, with which the Viennese organization has no direct relationship. Club rooms are to be opened in the Hotel Regina and the new American Medical Society will again arrange postgraduate courses in English in conjunction with the Academy of Medicine of the University of Vienna.

Those of us who were fortunate enough to make the pilgrimage to Vienna at the height of its medical prestige and during our own most impressionable years remember this unforgettable experience with a poignant vividness. Who could ever forget the kindly, soft-spoken, true gentleman, Ernst Fuchs? Tall and stately he was, with a most magnificent beard. To us, he was the greatest ophthalmologist in the world. The words he used may now be forgotten but his dignity and personality are indelibly etched on our memories.

We sat at the feet of Professor Meller, the aristocrat, the master surgeon, whose clear-cut discussions of surgical technique, beginning with his classical description of dacryocystectomy, were high points of ophthalmologic experience.

From Professor Lindner, who in his kindness spent many hours with us, we learned the rudiments of physiology and practical and theoretical points in refraction. At the time he was an exponent of velanoskiascopy, which somehow never seemed as effective after we returned home as it had in Vienna with the master's touch.

Dr. Adalbert Fuchs, now of New York, a popular teacher of pathology, whose dry humor and deliberate approach greatly simplified the subject, was manager of the course named for his illustrious father. Dr. Bachstetz had a knack of simplifying ocular motility, aided by models and enormous rotations of his own globes.

Among the then younger men to be remembered were: Dr. Pillat, whose skilled instruction in otherwise excellent English was interspersed with many "nicht wahr?"'s; Dr. Safar, a meticulous ophthalmoscopist who was aided by a volunteer assistant of whom we Americans then (and since) became very fond—Peter Kronfeld; Dr. Urbanek, who introduced us to the slitlamp;

Dr. Sallmann, who taught therapy; and Dr. Guist, a forceful but dogmatic teacher. Occasionally there was opportunity to visit the classes or clinics of great teachers in other branches of medicine, such as Erdheim or Freud and his disciples.

Not the least of the maturing process resulting from a sojourn in Vienna was the cultural aspect of a great city of music and art. Many were the visits to the opera, the concerts, the art galleries. There were delightful Viennese dinners at the Rathauskeller and various small restaurants with liquid refreshments which were then prohibited in the United States. Week-end expeditions were made to the Rax, to Semmering, and, upon one occasion some of us, after our first plane trip, attended a special surgical clinic held for us in Budapest by the great de Grosz. Parading along the Ring or in the Prater with our walking sticks we had the illusion that we were not tourists but an integral part of the environment.

For a period, we enjoyed the strangeness of language and customs of what seemed a different world, but a world into which we could enter naturally and enthusiastically. While Vienna lacked the gaiety of its prewar existence there remained the Gemütlichkeit and Old-World charm. Most Americans lived at pensions (where they had to pay Schlüsselgeld if they came in after midnight) or at hotels, such as the Hammerand or Zenit. The latter proved to be a Stundehotel, but many Americans stayed there, on Pelikangasse around the corner from the Allgemeines Krankenhaus, without permanent loss of respectability. Most of us visited eye clinics in other European cities after leaving Vienna, offering opportunities for comparison.

The glory of Vienna has faded, probably never to bloom again in full flower, but the memory lingers long among those ophthalmologists who look back upon it as the site of their own coming of age in ophthalmology. All Hail, Vienna!

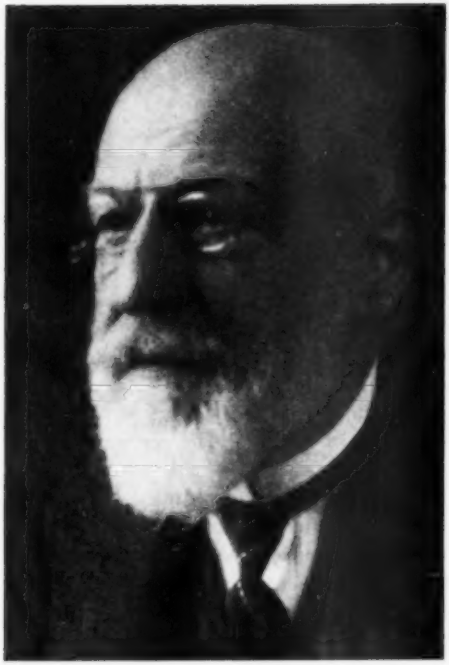
William A. Mann.

MAXIMILIAN SALZMANN

The readers of the JOURNAL will be interested to learn that on December 9, 1952, the Austrian School of Ophthalmology celebrated the 90th birthday of one of its great masters, Prof. Maximilian Salzmann. The celebration took place at the University of Graz where Salzmann was appointed to the chair of ophthalmology in 1911 and where he has continued to live since his academic retirement in 1934.

Because of his retiring, self-effacing personality, Salzmann is best known through his writings. In contradistinction to his globe-trotting teacher, Ernst Fuchs, Salzmann traveled very little, did not attend many scientific meetings outside his home town and had to be sought out in his laboratory or clinic. If one mustered the courage to break through the wall that seems to surround extremely retiring men, one could be certain of a cordial welcome from the master and of being shown some histologic or clinical gems, very much in the exact and detached manner in which a pure scientist would describe a rare specimen to a colleague. During the demonstration there would become noticeable, temporarily breaking through the air of detachment, the professor's deep love for the subject and his genuine pleasure at sharing his treasures with an interested visitor. Judging from recent reports, Salzmann at the age of 90 years is still the scientist and lover of ophthalmology whom we could not help but revere during his earlier, outwardly more active years.

When Salzmann, in 1888, began his graduate training under Ernst Fuchs, he brought with him a number of unusual intellectual gifts and qualifications that profoundly influenced his ophthalmologic career. He had been endowed by nature with an eminently logical and systematically organized mind which guided him securely and successfully through all his clinical and investigative work. He possessed a keen power of observation coupled with a natural skill to



MAXIMILIAN SALZMANN

record his observations accurately in drawings and paintings. During his gymnasium and university years, he had acquired a profound knowledge of mathematics and of human morphology. With these qualifications, it is not surprising that Salzmann, within a remarkably short time, became Ernst Fuchs's right-hand man and one of the main pillars of the clinic. A substantial but silent contributor to the early edition of Fuchs's *Textbook of Ophthalmology* he was the logical person to be trusted with the task of revising the later editions after Fuchs's academic retirement.

Salzmann's publications are characterized by their logic, their lucidity and fluidity. The stress is on the facts, on the consideration of all possible factors and all possible aspects of the problem, and on ophthalmology as a system. The evidence is presented in crystal-clear words and illustrations and the conclusions are drawn with utmost care. While a fair command of German is essential to appreciate fully most of Salzmann's publications, the English-speaking ophthalmologist is fortunate in having made available to him Salzmann's principal monograph "The Anatomy and Histology of the Human Eyeball." In translating this work into English Dr. E. V. L. Brown succeeded in retaining a good deal of the characteristic style of the original work.

Aside from this monograph, Salzmann is now best known for his work on the inferior conus, on retinal-vein obstructions in eyes affected with chronic glaucoma, and on the corneal dystrophy named after him. He will always be remembered as a pioneer in the field of gonioscopy and as an advocate of the scratch incision.

It is hoped that the celebration of Salzmann's 90th birthday succeeded in conveying to him how much the ophthalmologic world appreciates what he has done for the progress of ophthalmology. That expression of appreciation should serve to mitigate the handicaps that go with advancing years and the hardships endured during and after the last war.

Peter C. Kronfeld.

XVII INTERNATIONAL CONGRESS OF OPHTHALMOLOGY

September 13 through September 17, 1954
New York City
Waldorf-Astoria Hotel
Subjects for discussion: *Glaucoma* and *Uveitis*

OBITUARY

ARNOLD LOEWENSTEIN, M.D. 1882-1952

Arnold Loewenstein was born in 1882 at Karlsbad, at that time a part of the Austrian Empire, and he died in October, 1952, at Glasgow, Scotland. His early education was

ARNOLD LOEWENSTEIN, M.D.

received in Prague where he studied the basic sciences upon which his subsequent work was built. From the earliest stage in his career he was thinking and writing upon research problems. His early work was on botanic and anatomic subjects and part of his *wanderjahre* was spent at the Marine Biological Station in Naples. He became an assistant to Professor Fick in the Department of Anatomy in the German University in Prague.

In 1908, he was appointed a clinical assistant to Professor Elschnig and from then on he devoted himself entirely to ophthalmology. He passed through the usual continental promotion grades of senior assistant and privat-docent. In 1924, he was granted the title of Professor Extra-Ordinarius. At that time he was interested in the problem of electroretinography and his work, carried out in collaboration with Professor Kahn, is still referred to in the literature of electrophysiology. In 1939, he was compelled to leave his native land and found refuge in Britain. A position as a research assistant in the Tennent Institute of Ophthalmology in the University of Glasgow, Scotland, was created for him. He worked happily and fruitfully until the end. He collaborated with Professor Ballantyne in well-known studies of the vascular circulation within the eye. He delighted in the discovery of histologic minutiae and many papers came from his pen during these later years. He found great delight in helping younger and less experienced men and stimulating ideas flowed from his mind in a sparkling stream. He had an enormous knowledge of the literature of ophthalmology and a most retentive memory for original sources. He remembered the authors, names, and details of their early training in the case of continental colleagues, and for the others he had exchanged reprints with ophthalmologists in every quarter of the globe. These exchange reprints were carefully catalogued and immediate authority could often be produced in support of some recondite proposition. His books and reprints have been left to the University of Glasgow and the Western Infirmary in which the Tennent Institute is situated. These will form a lasting memorial to a delightful and productive colleague.

During his time in Scotland he became known to many of the service visitors to Glasgow during the war years and there must be many United States ophthalmologists who will recall the lecture demonstrations which he assembled for their benefit.

He worked hard for the country of his adoption and became a British citizen shortly after the war. It was seldom that he missed a meeting of the Ophthalmological Society of the United Kingdom or of the Oxford Ophthalmological Congress and many papers were contributed to the journals of the English-speaking world. Early in his career he had been told by Elschnig that it is a mistake for a young man to devote himself entirely to one aspect of one branch of a specialized subject and that wide interests are desirable. These precepts were put into

practice judging from the wide range of topics covered in more than 200 contributions which were made to the literature by this distinguished product of the Prague school.

Arnold Loewenstein was a man of great culture and many interests. He acquired a wide knowledge of the hills and countryside of Scotland. In his younger days he was an enthusiastic mountaineer and skier, but these pleasures were denied to him latterly, although he continued to walk in the country whenever opportunity arose. It was a pleasure to have known such a citizen of the world, representing as he did the best of European culture, and an inspiration to have seen how adversity can be surmounted.

W. J. B. Riddell.

CORRESPONDENCE

Spectacles for hemianopia

Editor,
American Journal of Ophthalmology:

In the October, 1952, issue of the American Journal of Ophthalmology, there is an article by Thomas A. Burns, et al. about spectacles for hemianopia. In this article, as well as in a former one of E. Bell (J.A.M.A., **140**:1924, 1949), the first description of such spectacles which I gave (Arch. f. Ophth., **100**:357, 1919) was not mentioned. Since that was a real new idea at the time and I also described the improvements of the visual field by such glasses, I think that I deserve priority.

(Signed) Joseph Igersheimer,
Boston, Massachusetts.

Use for binocular ophthalmoscope

Editor,
American Journal of Ophthalmology:

Many articles have described the use of the indirect binocular ophthalmoscope in studying the periphery of the retina.

Another use of this instrument occurred to us. The ultraviolet lamp is not always successful in locating a dislocated lens lying against the retina. By wearing the indirect ophthalmoscope and using it without a magnifying lens, the surgeon can easily see the crystalline lens. It is then easy to insert the loop behind the lens with one hand and, as the lens is elevated to the corneal section, a capsule forceps can be used gently to assist in extracting the lens. The lens and loop must be kept in view at all times for a successful delivery.

(Signed) John O. Martin,
Birmingham, Alabama.

BOOK REVIEWS

Selected Studies in Visual Optics. By Joseph I. Pascal, M.D., St. Louis, C. V. Mosby Co., 1952. 800 pages, 138 figures, bibliography, and index. Price: $12.50.

Pascal, like Javal before him, has limited his professional career almost wholly to the teaching and practice of ophthalmic optics. The present opus is the culmination of 40 active years of thought in this facet of ophthalmology which, at long last, has its deserved place in the sun. The book is not a desultory collection of previous publications as one might too hastily assume from its modest title but is instead a remarkably original and well-organized treatise—clear, detailed, and comprehensive—that includes almost every phase of clinical optics. It is the nearest equivalent to a royal road to optical knowledge as the author takes his disciples by easy stages to the highest vistas of understanding.

Pascal has a penchant for mnemonics. His substitution of D = a M for the conventional formula makes the required mathematics easier to remember. The instructive use of the benzene ring in relation to the cardinal points and the extraocular muscles certainly lessens the many possibilities of confusion. He is commendably punctilious on exact definition and precise terminology, for without doubt "sloppy definitions are a

source of perennial confusion." He sagely differentiates between optical, retinal, and mental images and illustrates the value of this discrimination in discussing the image size in accommodation. He shows how the general definition of a base curve, "a fixed standard curve for a variety of lens powers," is applied differently to spherical lenses, torics, and bifocals. The bewildering variability of optical symbols is deplored, and truly our national societies should recognize this plight and recommend local standardized designations.

Though Pascal's outlook is fundamentally orthodox throughout, the book is studded with original conceptions and methods. For instance, the radian method of calculation readily determines that only 13.5 mm. of lens is utilized in the normal range of eye motion. The idea of the accommodative unit explains, among other things, why a fully corrected hyperope requires reading glasses sooner than a myope in the same situation. Again, the correcting lens is shown to change the optical length of the eye rather than its power in that it effects predominantly a shift of the second principal point; and a simple method is expounded of utilizing the stereoscope to increase convergence while repressing accommodation, or vice versa. A special attraction for teachers of physiologic optics are fine quotable passages: "The mental and physical states of both patient and examiner are bound to modify the findings"; "The lens does not change the eye, but the lens changes the light so that the eye can focus it." The ingenious method for the direct determination of minus power on the optical bench will also appeal, as well as the brilliant addenda to the graphic determination of the spherocylindric equivalent of obliquely crossed cylinders.

This didactic gem deserves several editions. Judicious streamlining of the present material would permit a more thoroughgoing discussion of the astigmatic dial, procedures of binocular examination, the duochrome test, muscle imbalance, bifocal segments, trifocals, and telescopic spectacles.

When St. Thomas Aquinas was asked in what manner a man might best become learned, he answered, "By reading one book!" If this book is assimilated as if it were the only text on the subject, the reader will attain—in spite of some voids and deficencies therein—a keener, rewarding insight into the field of ophthalmic optics.

James E. Lebensohn.

BULLETIN OF THE GREEK OPHTHALMOLOGICAL SOCIETY. Athens, Greece. Volume 18, Part 1: Monthly sessions of the society, January to June, 1950.

Prof. G. Cosmetatos in "Clinical and therapeutic observations on detachment of the retina" tells how he systematically employed the methods of Gonin and Weve from 1934 until his retirement as director of the Athens University eye clinic in 1948, operating with 70 percent success in 374 more or less unselected cases.

B. Vassilopoulos traces the evolution of views regarding tubercle of the conjunctiva and reports a case of his own in which treatment with streptomycin was ineffectual and, in a paper on the ocular findings in erythremia, calls attention to a certain distribution of punctate pigmentary deposits on the anterior surface of the iris which he considers characteristic of this disease.

I. Kinnas reports the case of an albino in which the nasal half of each iris was nearly normal but the temporal half showed marked hypoplasia of the stroma and multiple small colobomas.

N. Trantas reports on the presence, often apparently transitory, of many cystlike spaces or vacuoles which he has observed with the slitlamp in the conjunctiva, either in the epithelium or just below it, in a case of acute iritis, in trachoma, and even in normal eyes. In another paper he reports on finding vessels identical with the so-called laminary veins of Goldmann and aqueous veins of Ascher in a corneal leukoma remote

from the limbus. The presence of such vessels in the central zone of the cornea confirms his belief that veins of this type have nothing to do with the circulation of the aqueous humor. His views in this regard are elaborated in a long paper detailing his study of the so-called aqueous veins of Ascher in 18 persons, and he reaffirms his conviction that neither Ascher's nor Goldmann's veins contain aqueous from Schlemm's canal but are merely empty blood vessels or else contain plasma.

G. Kaniclides reports two cases of ocular hypersensitivity to a one-percent solution of zinc sulfate. E. Theodorides and Coutrolicos report on a case of blastomycosis of the conjunctiva, a localization of the disease which they say has never been reported from any part of the world except Epirus in northern Greece; they suggest that special climatic factors may be responsible.

Among the cases presented and discussed are: stubborn iritis with secondary glaucoma treated successfully with nonperforating diathermy by Albaugh and Dunphy's method; successful removal of an intraocular cysticercus by the posterior route; ophthalmoplegic migraine manifesting unilateral ptosis and complete paralysis of the third and fourth nerves; unilateral Gunn's syndrome occurring in members of the same family and affecting the right eye in each case; secondary glaucoma following loss of the anterior chamber after cataract extraction and cured by injection of air into the anterior chamber; Harada's disease (two cases); anterior polar cataract simulating anterior lenticonus; bilateral aniridia and dislocation of the lens; optic atrophy beginning eight days after gastric hemorrhages and resulting in total blindness in three days.

C. Djacos presented a paper on the centenary of the invention of the ophthalmoscope with particular reference to the contribution of A. Anagnostakis, the father of modern Greek ophthalmology. Anagnostakis published his paper on the ophthalmoscope in 1853, and his contribution to the successful use of this instrument was very great. The earlier models of the Helmholtz instrument were so difficult to manage that hardly 10 ophthalmologists in the whole world were adept in ophthalmoscopy until an instrument simplified and redesigned by Anagnostakis was made available. Within the first six months, 800 instruments of his design were sold. All subsequent models derive essentially from his, which was the first to incorporate a concave mirror.

G. Cosmetatos and B. Vassilopoulos contributed an interesting account of the 18th-century knight errant of ophthalmology, John Taylor, and described his couching operation for cataract.

J. Charamis told of an oculist who practiced in Zante in the 18th century, Anthony Rousmelis, the holder of the first certificate of specialization ever issued, at least for Greece. Charamis also contributed a necrologic notice on the Cretan ophthalmologist, G. Photakis.

Summaries in French are given of most of the papers and case reports.

Harry K. Messenger.

TRANSACTIONS OF THE SOCIETE D'OPHTALMOLOGIE DE FRANCE. April, 1951, pp. 492-534.

G. Offret and Forest present a patient with severe headaches of vascular origin as proved by arteriography. G. Renard and Dinza describe their new equipment and method for detecting malingering of monocular amblyopia. Jourdy observed the rapid general spread of a lymphosarcoma of the skull in an infant. The metastasis included both orbits. Jean Sedan saw a peculiar superficial keratitis in five construction workers who handled a special wood polish and glue. Fellow workers of the same factory had occasional skin irritations.

A. Dollfuss discusses the importance of X-ray and radium treatment in cancerous growth of the eyeball and its adnexa and gives a clear summary of its possibilities.

He explains the technique and indications of the contact X-ray treatment, described by Chaoul, which has been used in superficial lesions of the lids and eyeball with great success in France since 1942.

Thomas, Cordier, Algan, and Mutel treated two children with bilateral retinoblastoma with X-rays and radium without enucleation of the more affected eye. One child has stayed well ever since 1946. The other child improved; the tumor was apparently destroyed but a mass appeared in the blind eye after three years and the optic nerve was found to be involved when the eye was finally enucleated. The child died 10 months later with widespread metastasis at the base of the skull.

A. Gallois reported the clinical and histologic findings in a case of Bowen's disease of the cornea and compared it with other cases of hyperplasia of the corneal epithelium which he had observed. Two elements are always present, namely, hyperplasia and dyskeratosis; clumping cells are only visible in Bowen's disease which he called hyperplastic corneal dyskeratosis with clumping cells.

R. Levy and C. Heydecker saw rubeosis iridis develop in patchy hemorrhages in the iris in an eye with thrombosis of the retinal vein and secondary glaucoma.

A. Lobstein and J. Muller emphasized the importance of additional neurologic studies and spinal puncture for the prognosis of sympathetic ophthalmia. Thomas, Cordier and Algan did an iridenclesis in sympathetic ophthalmia which could not be otherwise controlled, but the diagnosis of sympathetic ophthalmia was not verified anatomically in the sympathizing eye.

A. Brini presented two patients with aneurysm of the internal carotid, papilledema and impairment of vision, central scotoma and impaired color vision, and called attention to the importance of these signs and symptoms in the diagnosis of a possible intracranial aneurysm.

Alice R. Deutsch.

RECENT ADVANCES IN NUTRITION RESEARCH: with emphasis on the newer B vitamins. Proceedings of the seventh annual meeting, the National Vitamin Foundation, Incorporated, 150 Broadway, New York 38, New York, April 3, 1952. Nutrition symposium series, number 5, 129 pages. Price: $1.50.

The proceedings consist of nine articles by numerous authors concerning recent nutritional research. Especially emphasized is newer knowledge regarding vitamin B_{12}, pantothenic acid, and pyridoxine. Every ophthalmologist might be interested in an article which describes the successful treatment of seborrheic dermatitis sicca with pyridoxine ointment but probably only those with a broad spectrum of medical or farm interests would care to read about "The role of B vitamins in the nutrition of the pig," or "The comparative value of various antibiotics in swine rations."

When vitamin B_{12} labelled with radioactive cobalt was administered to rats, the radioactivity was found to be present even three months after injection, indicating that the vitamin is closely incorporated in the cells of the tissues. If vitamin B_{12} is taken by mouth, a large percentage is wasted by excretion in the feces but, if the vitamin is bound to yeast nucleic acid, the absorption is improved. From a study of antibody production, it is concluded that pantothenic acid, pyridoxine, and pteroylglutamic acid, all members of the vitamin-B group, are important in antibody synthesis.

The introduction of ACTH and cortisone has stressed the importance of the adrenal cortex. If rats are fed a pantothenic-acid deficient diet, there is a hemorrhagic necrosis of the adrenal cortex. This lesion is much worse if ACTH is given but it can be prevented by the administration of cortisone. However, the latter will not completely protect the life of the animal which will eventually die because of pantothenic-acid deficiency in the peripheral tissues.

The reactions produced by acute stress

were studied by immersing 12 medical students in very cold water (9°C.) for eight minutes. Some of the readers associated with academic institutions may feel this was not long enough. The students received orally 10 gm. of calcium pantothenate daily for six weeks and then they were "immersed again." From this happy research the authors conclude that the eosinophil and white blood-count response, as well as a battery of other laboratory findings, suggest that pantothenic acid influenced the response to stress. Strangely enough in a summarizing paragraph the authors agree with the reviewer that a "more prolonged stress" might have given a more definite answer.

Eleven patients with seborrheic dermatitis sicca were given 300 mg. pyridoxine daily by mouth for four weeks without improvement. However, when pyridoxine was incorporated in a water-soluble ointment base (10 mg./gm.) and applied locally, the treated areas cleared in five days and the control areas were unimproved. When the ointment was discontinued, relapse was common in three to six weeks but remissions were reinduced by again applying the pyridoxine ointment. Frank D. Carroll.

NUTRITION IN THE PRACTICE OF MEDICINE. By J. A. Bargen, P. R. Cannon, J. B. Condliffe, P. J. Culver, R. M. Kark, H. Necheles, and F. J. Stare. New York, The National Vitamin Foundation, 1952. 163 pages, bibliography. Paper cover. Price: $1.50.

Among the articles that may interest the ophthalmologist in this fourth number of the Nutrition Symposium Series are the two papers discussing tissue changes induced by nutritional deficiencies, and the final contribution—a remarkably penetrating analysis of the economic aspects of nutrition.

James E. Lebensohn.

TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM. London, J. and A. Churchill, Ltd., 1951, volume LXXI. 794 pages.

This volume contains 148 case reports and papers presented by members of the Ophthalmological Society of the United Kingdom and eight affiliated organizations.

The title of the address of the president, M. H. Whiting, was "Surgical treatment of rodent ulcer near the eye." Primary surgical excision, followed by irradiation if needed, is advised.

The Bowman Lecture, "The eye as a physiological agent," was presented by Sir Henry Dale. The basic information of the anatomy and physiology of the eye which William Bowman acquired is recorded.

"The influence of a low atmospheric pressure on the development of the retinal vessels in the rat" was studied by Fergus W. Campbell. The rate of progression of the vascular system from the optic disc to the periphery of the retina was diminished under conditions of the low-pressure chamber. The oxygen tension of the retinal layers is an important factor in the formation of the retinal vascular system.

John Foster gave the Doyne Memorial Lecture which presented the aims and obstacles in the ophthalmic clinic. Time studies of the various examinations which make up a complete eye study were made; steps to and equipment to speed up and increase the accuracy of the tests were discussed. The practical application of the many suggestions will prove most valuable to the harassed overburdened physician.

Harold Ridley's initial report on the use of intraocular acrylic lenses to replace the human lens following cataract extraction was presented. Continued use of this significant advance in ophthalmic surgery seems to justify the modest initial report of Ridley.

William M. James.

ABSTRACT DEPARTMENT

EDITED BY DR. F. HERBERT HAESSLER

Abstracts are classified under the divisions listed below. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is mentioned only in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. Anatomy, embryology, and comparative ophthalmology
2. General pathology, bacteriology, immunology
3. Vegetative physiology, biochemistry, pharmacology, toxicology
4. Physiologic optics, refraction, color vision
5. Diagnosis and therapy
6. Ocular motility
7. Conjunctiva, cornea, sclera
8. Uvea, sympathetic disease, aqueous
9. Glaucoma and ocular tension
10. Crystalline lens
11. Retina and vitreous
12. Optic nerve and chiasm
13. Neuro-ophthalmology
14. Eyeball, orbit, sinuses
15. Eyelids, lacrimal apparatus
16. Tumors
17. Injuries
18. Systemic disease and parasites
19. Congenital deformities, heredity
20. Hygiene, sociology, education, and history

1

ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Cassady, J. V. **Developmental anatomy of nasolacrimal duct.** A.M.A. Arch. Ophth. **47**:141-158, Feb., 1952.

This is an excellent treatise on the developmental anatomy of the nasolacrimal duct with ample illustrations. The nasolacrimal passages of 15 full term stillborn infants were examined. This investigation revealed that in 73 percent of a number of stillborn infants the lumen of the lacrimal duct was not connected with the nasal cavity at birth. The lower end of the lacrimal duct was separated from the nose by an imperforate membrane. The relationship to dacryocystitis in infants is obvious. George S. Tyner.

2

GENERAL PATHOLOGY, BACTERIOLOGY, IMMUNOLOGY

Alagna, G., and Bombara, G. **Experimental investigations on the presumed antiallergic and antihistaminic activity of penicillin.** Arch. di Ottal. **54**:89-108, May-Aug., 1950.

The results of their experiments led the authors to conclude that penicillin given intradermally in small doses neither inhibits nor attenuates the anaphylactic and antihistaminic shock of guinea pigs, the histamine reaction in the skin or conjunctiva of rats, and the Arthur phenomenon in rabbits. These results fail to clarify the question of an antiallergic and antihistaminic action of penicillin claimed by other workers. (4 figures, 30 references)

John J. Stern.

Birge, H. L. **Ocular aspects of mycotic infections.** Tr. Am. Ophth. Soc. **49**:487-523, 1951.

The ocular aspects of mycotic infections must be considered in connection with fungus infection in general. Two types of ocular mycotic infection are recognized: 1. infection by molds producing superficial lesions and 2. mold infections which produce local and systemic lesions. Diagnosis and treatment of ocular fungus infection is a problem for both ophthalmologists and others in the medical profession. New types of infection are being reported and old syndromes re-evaluated while diseases once restricted to certain endemic areas are appearing in new localities. Fourteen pathogenic groups of fungi deserve special attention out of hundreds which may be found in or about the eye.

The possibility of fungus infection must be constantly kept in mind to avoid mistakes in diagnosis.

David O. Harrington.

Bocci, G. **Sensitization of the conjunctiva with tuberculo-antigens.** Boll. d'ocul. **30**:422-426, July, 1952.

For 15 consecutive days an ointment containing 200 milligrams of killed mycobacterium tuberculosis in one gram was instilled into the rabbit's conjunctival sac. Fifteen and 30 days later, four animals received intravenous injections of killed bacteria or of 1 cc. of concentrated diagnostic anatuberculin. Only the latter group developed, during the following 48 hours, conjunctival hyperemia in the previously treated eye. (7 references)

K. W. Ascher.

Capolongo, Giuseppe. **Histologic and pathogenic investigations on the conjunctival nodules and vesico-pustules of variola.** Arch. di Ottal. **54**:135-150, May-Aug., 1950.

The inflammatory infiltration of the conjunctival pustule of variola shows a preponderance of mononuclear cells, many of which look like plasma cells. This indicates a special inflammatory stimulus (represented by the specific virus) not to be confused with the polynuclear reaction to the common pyogenic organisms. The infiltration of the conjunctival nodules show analogous characteristics pointing to a certain interdependence between the two lesions, but they can develop independently. They remind one of the histological structure of phlyctenules. The conditions are more frequent in young subjects and are influenced by constitutional factors of which scrophulous diathesis is an example. This may indicate an allergic origin with a special tissue sensitization caused by the variola virus or tubercle bacillus. (4 figures, 8 references)

John J. Stern.

Coqui, Carlos. **Radiology of the orbit.** Rev. méd. d. Hosp. gen. **15**:473-485, Aug., 1952.

The author discusses the application of radiology to the diagnosis of orbital lesions. The anatomic landmarks which are of importance in the interpretation of the films are described in detail.

F. H. Haessler.

D'Ermo, F., and Ovary, Z. **Ocular signs of anaphylactic edema of the albino rat.** Boll. d'ocul. **31**:347-352, June, 1952.

Intravenous egg white injection produces localized edema of the extremities, ears, tongue, and genitalia. In the eye, the authors found retinal edema, and, when highly dispersed India ink was injected simultaneously, particulate matter fixed to the endothelial cells of the small conjunctival vessels. (1 color photograph, 5 photomicrographs, 10 references)

K. W. Ascher.

Gonçalves, Paiva. **The effects of nuclear radiation upon the eyes in atomic explosions.** Rev. brasil. oftal. **10**:321-329, June, 1952.

In this review, presented before the Brazilian Society of Ophthalmology, the author discusses the refractory external inflammations, the retinal complications, and the crystalline lens changes that are encountered in persons who have been exposed to atomic explosions or other types of nuclear radiation. The material is drawn from the well known reports.

Theodore Bisland.

Latte, B., and Venturi, G. **Study of the action of Newcastle virus on the rabbit eye.** Boll. d'ocul. **31**:353-360, June, 1952.

Newcastle virus, type Na of the Istituto Sierologico Italiano, was instilled into the conjunctival sac, inoculated into the cornea, into the anterior chamber, and into the vitreous of rabbits. Allantoic fluid was used as a vehicle. Conjunctival instil-

lation was not followed by pathologic changes; all other methods produced reactions similar to those occurring after administration of other types of different vira as reported by numerous observers. (5 figures, 9 references) K. W. Ascher.

Snell, A. C., Jr. **Ocular and subcutaneous inflammatory responses to transplantation of heterologous tumors.** A.M.A. Arch. Ophth. **48**:298-306, Sept., 1952.

This investigation was undertaken to study the differences between the ocular and the subcutaneous inflammatory responses following heterologous tumor transplantation, and to determine whether such differences could account for the inferiority of the ocular route as a transplantation site. The tumor used in the experiments is the laboratory tumor MT8. The defense of the mammalian organism against transplantation is of two kinds, a foreign-body reaction, made up mostly of fibroblasts and macrophages and a lymphocytic immunologic response. After heterologous transplantation of tissue the first type of reaction occurs quickly and intensely, followed and overlapped by the second. In homologous transplants the first type of reaction occurs feebly. The author reports that transplants of this mouse carcinoma excite a relatively mild macrophagic and fibroblastic reaction in the guinea pig eye. In contrast, the subcutaneous tissues of the guinea pig react to transplants of this tumor with a moderate macrophagic and an intense fibroplastic response. (4 photomicrographs) R. W. Danielson.

3

VEGETATIVE PHYSIOLOGY, BIOCHEMISTRY, PHARMACOLOGY, TOXICOLOGY

Ainslie, D., and Smith, C. **Polymyxin E.** Brit. J. Ophth. **36**:352-361, July, 1952.

The several types of polymyxin are allied antibiotics extracted from B. polymyxin and are bacteriocidal to gram-negative organisms but are limited in use because of various toxic reactions in man. Polymyxin E is probably the least toxic. The drug is a white powder, very soluble in water. In the rabbit, corneal ulcers were produced with Ps. pyocyanea and treated immediately and later with subconjunctival injection of polymyxin E. in carefully controlled groups; the beneficial results were decisive and dramatic. Two cases of corneal ulcer with hypopyon in man, but not proved to be pyocyaneous ulcers, were treated by subconjunctival injection of 200,000 units of the drug with very prompt benefit. (12 figures, 11 references) Morris Kaplan.

Azzolini, U., and Faldi, S. **Tolerance and action of terramycin in the eye.** Gior. ital. oftal. **4**:114-119, March-April, 1951.

Terramycin is well tolerated by the rabbit and human eye when given in 0.5 percent collyrium, subconjunctival injection of 2.5 mg. in 0.5 cc. of water, and 1 mg. in the anterior chamber. The rabbit also does well with 1 mg. injected into the vitreous. This high degree of tolerance together with its broad field of activity against both gram positive and negative bacteria and some viruses combine to make this an extremely useful antibiotic. (14 references) J. J. Lo-Presti.

De Berardinis, E., and Bonovolonta, G. **Scar-producing action of some amino acids on experimental corneal lesions and their influence on the metabolism of the cornea.** Gior. ital. oftal. **4**:86-99, March-April, 1951.

Healing time of experimental lesions of rabbit and guinea pig corneas was found to be influenced by various amino acids. These compounds as a group shortened the process in the following order: arginine, asparagine, histidine and cysteine were the most active, phenylalamine and glutamine, less so, and tryptophane and proline were least effective. Employing

the Warburg apparatus, the oxygen consumption of both rabbit and guinea pig corneas was found to be increased by amino acids in the same order as they stimulated healing. This metabolic effect is believed by the authors to be responsible for the accelerated scar formation observed with amino acid application in experimental corneal lesions and should prove a valuable clinical aid. (3 tables, 36 references) J. J. Lo-Presti.

D'Ermo, F. **Preliminary investigations of the protein content of intraocular fluids, using filter paper electrochromography.** Boll. d'ocul. **31**:321-336, June, 1952.

Using the technique of Cremer and Tiselius, the authors compared chromatographs of human blood serum, aqueous humor, vitreous body, and the crystalline lens. They also compared rabbit's aqueous from an eye with tuberculous uveitis and one with allergic uveitis with the serum of the allergic animal. The vitreous body of the eye with tuberculous uveitis contained hyalomucoid 21.9, albumin 9.6, and globulin 13.2. Suspension of the lens of a horse revealed alpha crystalline 45 to 46 percent and beta crystalline 53 to 55 percent. (7 figures, 18 references) K. W. Ascher.

Ferraris de Gaspare, P. F. **Experimental investigations of beryllium injury of the eye.** Boll. d'ocul. **31**:337-346, June, 1952.

Sulfate, fluoride, citrate and carbonate of beryllium and the pure element were applied to the rabbit cornea, injecting the soluble salts into the stroma and depositing the insoluble ones into prepared corneal pockets. Observation over periods as long as eight months revealed that the sulfate and fluoride of beryllium act as any other caustic; the citrate did not produce any specific changes and was rapidly eliminated. Pure beryllium remains in the tissue without producing pathologic reactions. The carbonate, which does not readily dissociate, produces severe tissue changes similar to those observed in human eyes. (2 figures, 25 references) K. W. Ascher.

Frohman, C. E., and Kinsey, V. E. **Studies on the crystalline lens.** A.M.A. Arch. Ophth. **48**:12-18, July, 1952.

This is a report of investigations undertaken to determine whether the amounts of high energy phosphate in the various sections of the lens conform to a pattern discussed by the authors. Most of the energy for metabolic processes in the tissues is thought to be made available from the breakdown of unstable chemical compounds known as "high-energy phosphates." Recent observations suggest that such compounds are produced solely by the lens epithelium. These compounds must therefore diffuse through the lens in order to be utilized by the cortex and nucleus. The results of the investigations supported the belief that the lens epithelium contributes energy for the metabolic requirements of the entire lens in the form of high-energy phosphates. Energy is apparently stored in the region of the posterior cortex. George S. Tyner.

Janes, R. G., Bounds, G. W., Jr., and Leinfelder, P. J. **Ocular complications in the rat made diabetic with alloxan.** A.M.A. Arch. Opth. **48**:414-419, Oct., 1952.

This is a report of investigations undertaken to study the effects of nicotinic acid on the development and progression of cataract and other ocular complications in experimental diabetes. Rats were made diabetic with alloxan and then fed a synthetic diet; in one portion of the series 1-percent nicotinic acid was added to the diet. Cataractous changes were observed first in the posterior cortical or posterior subcapsular area. The rats were observed until the cataracts became mature. The animals which received nicotinic acid showed a slower progression of cataracts.

Intraocular hemorrhages were less frequent and slower in appearing in the animals receiving nicotinic acid. No conclusion was reached regarding the mechanism of action of nicotinic acid in reducing the hemorrhagic tendency or delaying the progression of lens opacities. (4 figures, 13 references)

George S. Tyner.

Kinsey, V. Everett. **Physiologic chemistry of the eye.** A.M.A. Arch. Ophth. **48**:498-516, Oct., 1952.

The papers published during 1951 which deal directly with the chemistry of the eyes as well as related subjects are reviewed. Among the significant findings reported are the demonstration of succinic dehydrogenase in the cornea which is concerned with maintaining a state of deturgescence; the difference in transparency of the cornea and sclera was correlated with the degree of hydration; the use of antibiotic derivatives of Actinomycetes did not interfere with corneal healing whereas bacitracin, penicillin, zephiran, phemerol, local anesthetics and pilocarpine did; subconjunctival administration of cortisone delayed stromal, but not epithelial, healing in experimental corneal grafts in the rabbit; in experimental diabetes not only the level of blood sugar but the configuration of the sugar is important in its cataractogenic property; collagenous fibrous components of the vitreous were photographed with an electron microscope; rhodopsin has been synthesized in a system of known components. (95 references)

George S. Tyner.

Lavine, O., Langenstrass, K. H., Bowyer, C. M., Fox, F. E., Griffing, V., and Thaler, W. **Effects of ultrasonic waves on the refractive media of the eye.** A.M.A. Arch. Ophth. **47**:204-219, Feb., 1952.

The authors have succeeded in producing new types of ultrasonic cataracts in a series of experiments on calves' eyes. The results of these investigations suggest further experiments which may lead to definite conclusions as to whether clinical cataracts can be cleared by exposure to ultrasonic waves. George S. Tyner.

Leopold, Irving H. **Pharmacology and toxicology.** A.M.A. Arch. Ophth. **48**:163-261, Aug., 1952.

The year's literature (1951) on the antibiotics, chemical and biological agents, hormonal agents, autonomic drugs, anticoagulants, radiation, vitamins and physical agents as applied to ophthalmology, is reviewed. (9 figures, 350 references)

George S. Tyner.

Leopold, Irving H. **Autonomic drugs and their influence on choroidal vessel caliber.** Tr. Am. Ophth. Soc. **49**:625-672, 1951.

Autonomic drugs are classified according to the neuro-humerol theory of nerve impulse transmission, and ocular effects of new ones are reviewed. A method of observing the choroidal circulation through a scleral window is described. The influence of autonomic drugs systemically and locally administered on the choroidal circulation was observed. No drug caused any change in the caliber of the observed choroidal vessels. Axon reflexes, paracentesis, superior cervical sympathetic ganglionectomy, induced fever, and rise in intracranial pressure failed to produce noticeable change in the choroidal vessels. Death of the animal and rises in intraocular pressure produced blanching of the vessels with cessation of blood flow but no alteration in the caliber of the vessels observed.

David O. Harrington.

Ludány, G., Orbán, T., and Vajda, G. **The effect of aqueous humor on the**

phagocytosis of bacteria by leukocytes. Szemészet **1**:15-20, 1952.

The effect of normal aqueous humor on the phagocytosis of bacteria by leukocytes was estimated in dogs anesthetised by pernocton. Phagocytosis was measured with Wright's method employing surviving leukocytes of rats and dogs. The normal aqueous humor of dogs increased the phagocytosis of staphylococci by 54 percent, that of typhoid bacillus by 45 percent, on an average, as compared with physiologic salt solution. This effect is considerably (3 to 6 times) weaker than that of normal serum. The effect of the secondary aqueous humor was respectively 60 and 34 percent higher. This effect persisted as long as two to three hours after the first puncture. The normal human aqueous increased phagocytosis 71 and 41 percent, respectively; the secondary aqueous humor was 59 and 48 percent. Direct stimulation of the cervical sympathetic in dogs had no significant effect on the phagocytosis-increasing effect of the aqueous fluid, although the positive inotropic effect of the stimulation could be observed in a Straub heart. The fact that sympathetic stimulation results in the augmentation of the capacity of normal serum to enhance phagocytosis should not be regarded as a direct biogenic sympathetic mediator action. Gyula Lugossy.

Ludvigh, Elek. **Possible role of proprioception in the intraocular muscles.** A.M.A. Arch. Ophth. **48**:436-441, Oct., 1952.

It is believed that the extraocular muscles lack any true proprioceptive organs and that the sense of position is absent in the eyes. The existence of muscle spindles in the extraocular muscles has caused much controversy in the subject because elsewhere in the body these end organs are considered to be concerned with proprioception. This paper reports experiments conducted in an effort to demonstrate the presence or absence of a sense concludes that the muscle spindles in the eye muscles are not concerned with proprioception and suggests that similar end organs in skeletal muscles may not be concerned with proprioception. He suggests that the sense of position of limbs may be mediated by articular sensitivity alone. (1 figure, 15 references)

George S. Tyner.

Ludvigh, Elek. **Control of ocular movements and visual interpretation of environment.** A.M.A. Arch. Ophth. **48**:442-447, Oct., 1952.

The second paper on the same subject advances the hypothesis with supporting evidence that the chief function of the muscle spindles in the extraocular muscles may be to provide a "parametric feedback" which alters the response of the muscle to motor stimulation similar to that in skeletal muscle. The "feedback" mechanism as applied to the eyes may be considered as the system whereby responses from the retina bring about corrective movements of the eyes on change of fixation. The spindles in the extraocular muscles provide a portion of the system for the control of ocular movements of fixation and pursuit. (19 references)

George S. Tyner.

von Sallmann, Ludwig. **Further efforts to influence X-ray cataract by chemical agents.** A.M.A. Arch. Ophth. **48**:276-291, Sept., 1952.

In a previous preliminary paper, the author reported that the onset of radiation cataract could be delayed if cysteine were injected intravenously before the exposure. This more complete report reiterates those findings and further states that subconjunctival injections before exposure were also effective. However, injections after the exposure had no effect. Glutathione and thiourea were less effec-

tive than cysteine; sodium thioglycollate and dimercaprol (BAL) were ineffective. (References) R. W. Danielson.

4

PHYSIOLOGIC OPTICS, REFRACTION, COLOR VISION

Burian, H. M., and Watson, C. W. **Cerebral electric response to intermittent photic stimulation in amblyopia ex anopsia.** A.M.A. Arch. Ophth. **48**:137-143, Aug., 1952.

This is a report of investigation concerning electroencephalographic changes in patients with amblyopia ex anopsia in relation to controlled retinal stimuli. The authors conclude that there is a significant difference in cerebral response to light stimulation between amblyopic and normal eyes in the same subject when the visual acuity of the amblyopic eye is 20/70 or less. These investigations suggest that the visual defect in amblyopia ex anopsia is cerebral rather than retinal. (6 figures, 8 references) George S. Tyner.

Hatcher, William. **Extreme axial hyperopia.** A.M.A. Arch. Ophth. **48**:161-162, Aug., 1952.

A case of axial hyperopia of 21 and 20 diopters in the right and left eye respectively is reported. The patient was followed from four to nine years of age; during this time the hyperopia was reduced to 18 diopters. Glaucoma was suspected because of the high tonometric readings but, because of the abnormal size of the eyes, small corneal diameters and negative provocative tests, probably erroneously. (2 references) George S. Tyner.

de Leonibus, F. **Further investigations on the astigmatism of the crystalline lens.** Boll. d'ocul. **31**:385-395, July, 1952.

Using Nordenson's method, the author measured the curvature of the anterior lens surface of one eye with high hypermetropic astigmatism and of two eyes with high myopia with astigmatism. As previously demonstrated for emmetropic eyes (Ann. di ottal. e clin. ocul. 71:129, 1943), inverse astigmatism of the lens, usually due to the curvature of the posterior lens surface, is often found in ametropic eyes as well. This lens astigmatism may increase, diminish or neutralize the astigmatism of the anterior corneal surface. (3 tables, 10 references) K. W. Ascher.

Ogle, Kenneth N. **Disparity limits of stereopsis.** A.M.A. Arch. Ophth. **48**:50-60, July, 1952.

A survey of the literature shows that no systematic study has ever been made of the limiting disparities between the images in the two eyes, and the corresponding regions of space within which stereoscopic depth perception exists. The author describes an apparatus which permits one to determine these limiting disparities without introducing empirical factors for spatial localization. Experimental data obtained from two observers show that there are three ranges of disparity: in the first, stereopsis occurs with single (fused) images; in the second, stereopsis exists with double images, and, finally, there is a range of disparities within which a qualitative sense of depth of the two double images occurs. For greater disparities, the images are indefinitely localized. The limiting disparity for a patent stereoscopic experience of depth at the foveae is about 20 minutes of arc, and this increases rapidly to nearly 90 minutes of arc for a peripheral angle of 6 arc degrees. The qualitative sense of a difference in distance of the double images from the point of fixation ceases for disparities of about 25 minutes of arc at the fovea and of nearly 4 arc degrees at a peripheral angle of 6 arc degrees. The existence of these limiting disparities has implications for

one's understanding of the neuroanatomical organization of the two visual systems, the fusional processes, and the origin of stereopsis, and for any general theory of binocular spatial localization.

G. S. Tyner.

Ogle, Kenneth N. **Distortion of the image by ophthalmic prisms.** A.M.A. Arch. Ophth. **47**:121-131, Feb., 1952.

The distortion of images as seen through ophthalmic prisms is discussed. Prism lenses cannot be made which will eliminate distortion. Only trial case prisms have plane surfaces. Those in ophthalmic lenses are ground with spherical or toric surfaces. Unsymmetric angular magnification can be eliminated by a suitable choice of base curve; vertical angular magnification can be eliminated by making the front surface of the prism a plane, but the apparent curvature of vertical lines as viewed through a prism cannot be eliminated.

G. S. Tyner.

5

DIAGNOSIS AND THERAPY

Berens, C. **Special suturing and fixation forceps.** A.M.A. Arch. Ophth. **48**:348, Sept., 1952.

Berens describes a forceps with two fine teeth on each blade for use in corneal suturing and for scleral fixation in cataract extraction. The teeth are directed at an angle of 160 degrees to the blades to facilitate grasping of the lips of the corneal and scleral wounds.

R. W. Danielson.

Berke, R. **Ptosis clamp for holding the levator muscle during resection of the levator palpebrae.** A.M.A. Arch. Ophth. **48**:346-347, Sept., 1952.

Berke describes a ptosis clamp to hold the levator tendon securely while it is being freed from its several attachments. (1 figure) R. W. Danielson.

Braley, A. E., and Allen, L. **A corneal contact prism and lens for slit-lamp examination of the fundus.** Tr. Am. Ophth. Soc. **49**:477-483, 1951.

Two new types of contact lens, for use in a speculum similar to the Allen gonioscopic lens are presented. One has a tilted anterior plane surface for use in slit-lamp biomicroscopy of the peripheral fundus and the second has a planoconcave lens for use in observation of the central fundus. David O. Harrington.

Buxedo, R. **Use of typhoid vaccine in continuous intravenous infusion in treatment of eye diseases.** A.M.A. Arch. Ophth. **48**:352-361, Sept., 1952.

In this second article, the author presents a complete survey of the literature on the subject. T. D. Allen was one of the first to describe the use of typhoid vaccine in ophthalmology. Before 1942 the treatment consisted of repeated single injections, when Solomon and Samkin first used the continuous intravenous infusion in the treatment of subacute bacterial endocarditis. Curry and Shaw were the first ophthalmologists to use the continuous method and varied the height of fever by the rate of flow. The author does not advocate high temperature and maintains a constant flow. In 1931 Nelson had advocated the two dose system in which the second dose was given two or three hours after the first in order to quickly increase the low fever already produced. Cordes in 1935 advocated much smaller doses than had previously been given; he begins with 5,000,000 organisms. Curry and Shaw give one billion and Buxeda two billion by the continuous method.

The author also reviews the many theories of the mode of action of the vaccine, whether through fever or immune reaction, leucocytosis or vasodilation. Attention has been called to the similarity of the response to intravenous injections of typhoid vaccine and corticotropin, prob-

ably by the production of cortisone in each. The best results are obtained when the vaccine is used early.

R. W. Danielson.

Buxedo, R. **Use of typhoid vaccine in continuous intravenous infusion in treatment of eye diseases.** A.M.A. Arch. Ophth. **48**:307-312, Sept., 1952.

This article on the therapeutic use of typhoid vaccine, deals with the technique and advantages of the continuous intravenous infusion method and ten case reports. Two billion killed typhoid organisms are placed in an infusion flask containing one liter of sterile isotonic salt solution. The patient lies in bed and a 22-gauge needle, connected to a plastic tube is inserted into an antecubital vein. The rate of infusion is set at 20 to 25 drops per minute and infusion of one liter takes 8 to 12 hours. The patient is allowed to move his arm and to massage it with the other hand frequently. The body temperature is taken every hour and the flask is shaken every 15 minutes. Chills or discomfort are controlled by the administration of 50 mg. demerol, which may be repeated as often as necessary. No antipyretic or analgesic is administered until the temperature is normal. The treatment is started in the morning, no lunch is given, but a light supper is permitted. The infusion may be repeated within 48 to 72 hours, but in many cases only one treatment is required. The author claims the following advantages: 1. the chill is mild and can be controlled by demerol. 2. the height of fever can be controlled. 3. the temperature is usually between 99° to 101° F. and results have been as good as when it is two or three degrees higher, and 4. usually one treatment is required and time in the hospital is shortened. The ten cases were chiefly of iridocyclitis and excellent results are reported.

R. W. Danielson.

Duggan, W. F. **Visual field changes due to tumors of the choroid.** Tr. Am. Ophth. Soc. **49**:420-434, 1951.

A study of color fields is of value in differentiating a retinal from a choroidal lesion. When the outer retinal layers are affected there is a relative reduction in blue perception as compared to red, whereas the reverse is true in defects of conduction. Field studies are even valuable when the diagnosis is obvious and supplement fundus photography.

David O. Harrington.

Guerry, DuPont. **The use of the Sanborn electromanometer in the study of pharmacological effects upon the intraocular pressure.** Tr. Am. Ophth. Soc. **49**: 525-555, 1951.

The Sanborn electromanometer satisfies the criteria for a research ophthalmomanometer. The ease of sterilization of the instrument and the minimal trauma incident to introduction of a fine needle into the anterior chamber are factors favorable to its use in human eyes. It appears likely from the experiments that the introduction of a 30 gauge needle into the normal rabbit eye has no effect on intraocular pressure. Local instillation of aqueous nupercaine has no effect on intraocular pressure. Atropine, eserine, or neosynephrine cause slight to moderate lowering of intraocular pressure. CCK 179 injected intravenously in the cat causes adrenergic block with reversal of the usual adrenalin effect and lowering of intraocular pressure. This drug may be of value in the treatment of recalcitrant acute glaucoma and should be better tolerated than the more toxic dibenamine series. David O. Harrington.

Jones, L. T., and Goldman, J. **Use of the erysiphake for deeply embedded corneal foreign bodies.** A.M.A. Arch. Ophth. **48**:48-49, July, 1952.

An erisophake was successfully employed to remove a deeply embedded corneal foreign body by suction.

George S. Tyner.

Michaelson, I. C. **Comparison of results of cortisone treatment by instillation and by subconjunctival injection.** A.M.A. Arch. Ophth. **48**:144-147, Aug., 1952.

Cortisone was injected subconjunctivally and applied topically in 14 rabbits with lesions of the cornea. No significant difference was noted in the response to treatment. (16 references)

George S. Tyner.

Paton, R. T. **A Method of preventing retaining sutures from cutting into grafts.** A.M.A. Arch. Ophth. **48**:344, Sept., 1952.

Paton describes a plastic cup which is designed to maintain contact between the corneal graft and the recipient cornea and so prevent injury to the graft from direct sutures or from the pressure of overlying sutures. (3 figures) R. W. Danielson.

Schmidt, I., and Fleck, J. **Rotator and illuminator for pseudoisochromatic plates.** A.M.A. Arch. Ophth. **48**:75-82, July, 1952.

A rotator and illuminator for pseudoisochromatic plates which provides standardization in respect to exposure time, illumination, and arrangement was designed especially for routine examinations.

G. S. Tyner.

Szabó, Gy. **Local application of streptomycin in tuberculous eye diseases.** Szemészet **2**:70-75, 1952.

In phlyctenular conjunctivitis or keratoconjunctivitis, the local administration of streptomycin is followed by strikingly good results even in cases resistant to other procedures. The duration is shorter, results are better, corneal scars thinner. Good effect may be expected in recent, diffuse, exudative tuberculoallergic processes of the uveal tract also. The drug is well tolerated, no focal reaction occurs. Animal experiments have shown that local administration of streptomycin is far more effective than intramuscular. The strikingly good results obtained in tuberculoallergic patterns by simple instillation suggest that streptomycin has not only a bacteriostatic action, but probably also another effect, perhaps through the neutralisation of toxins. Gyula Lugossy.

Thygeson, P., and Geller, H. O. **Terramycin in ocular infections.** Tr. Am. Ophth. Soc. **49**:185-205, 1951.

A report on the topical use of terramycin in 478 patients with various ocular infections shows that the therapeutic results compare favorably with those obtained with aureomycin. No instances of sensitivity were recorded and there were no complications from oral use in a small series. Effects were favorable in inclusion conjunctivitis and trachoma, and questionable or absent in herpes corneae, herpes zoster and other viral diseases. Twenty-two of 25 strains of staphylococci were susceptible to terramycin in in-vitro tests and the drug was of value in early staphylococcus blepharoconjunctivitis without meibomitis, but was ineffective in cases with major participation of the meibomian glands.

David O. Harrington.

6

OCULAR MOTILITY

Arce, Alfonso. **Retinal correspondence in relation to the characteristics of strabismus.** Rev. peruana otorrinolaring. y oftal. **2**:36-44, July-Dec., 1951.

The most important character of strabismus in determining the type of retinal correspondence is the value of the angle of deviation. The greater this is, the greater is the incidence of abnormal cor-

respondence. Alternation and divergence do not influence the type of correspondence directly but through the angle of deviation which these forms of strabismus present more frequently. Intermittent strabismus gives rise to a greater incidence of normal correspondence but this action loses its importance because of the infrequent occurrence of intermittent strabismus (5 percent).

Roberto Buxedo.

Burian, Hermann M. **Strabismus.** A.M.A. Arch. Ophth. **48**:90-107, July, 1952.

The literature on the subject for the past year is reviewed. (69 references)

George S. Tyner.

Coppez, Leon. **Observations on the differential diagnosis of paralytic vertical diplopia.** Arch. d'opht. **12**:373-380, 1952.

The author discusses in detail the diagnosis of the vertical diplopias of paralytic origin by means of the projection-coordinator of Zeiss, which is based on the method originally described by Hess in 1909. He notes also that this apparatus can be used effectively in the diagnosis of those cases of concomitant strabismus having simultaneous macular perception without false projection. By this method a chart of the fields of fixation can be made rapidly and recorded for progress studies. The fields characteristic of the different types of paresis and paralysis are illustrated and discussed. (4 figures, 1 reference)

Phillips Thygeson.

Costa Fernandes, Ruy. **Duane's syndrome.** Rev. brasil. oftal. **10**:333-246, June, 1952.

The author finds 231 cases of Duane's syndrome in the world literature, 48 of which are bilateral. 79.9 percent of the unilateral cases affected the left eye; 58.6 percent of the unilateral cases and 46 percent of the bilateral occurred in females. The anatomic and physiologic pathology, the etiology, symptomatology and therapy of this condition are reviewed. A case of a 15-year-old white girl with a unilateral Duane's syndrome on the left side, and the additional finding of rachischisis is reported, bringing the total in the Brazilian literature to three cases.

Theodore Bisland.

Urist, Martin J. **Surgical treatment of esotropia with bilateral elevation in adduction.** A.M.A. Arch. Ophth. **47**:220-247, Feb., 1952.

The author presents case histories and discussion of the surgical treatment of esotropia associated with bilateral elevation in adduction. He advocates bilateral recession of the medial rectus muscles and bilateral recession of the inferior obliques when necessary. The recession-resection operation gives good results if the esotropia is the same on looking up and looking down. He is opposed to unilateral recession of the inferior oblique and bilateral resection of the lateral rectus in the cases under discussion.

George S. Tyner.

7

CONJUNCTIVA, CORNEA, SCLERA

Abreu Fialho, Sylvio. **Characteristics of the cadaver cornea.** Rev. brasil. oftal. **10**: 315-319, June, 1952.

The author reviews some of the work done at the cornea bank of the Santa Casa de Misericordia Hospital on the conservation of cadaver corneas. In order to reduce clouding and to facilitate obtaining lamellar grafts the posterior two-thirds of the globe is imbedded in paraffin and kept in the refrigerator at temperatures of about 4° C. for a maximum of three days. For perforating grafts, the isolated cornea is kept in paraffin in the refrigerator. Experiments conducted with the isolated cornea suspended in the refrigerator

showed a loss of weight of 15 to 20 percent in two hours and 64 to 78 percent in 24 hours, due to dehydration. Immersing severely dehydrated corneas in Ringer's solution for 24 hours produced a hydration of the cornea to, and frequently in excess of, the initial weight.

Theodore Bisland.

Alagna, G. **Influence of vitamin B2 on the healing of corneal wounds.** Arch. di Ottal. **54**:77-88, May-Aug., 1950.

Vitamin B2 given locally or intravenously accelerates the rate of healing of experimental corneal wounds. It affects equally the repair of connective tissue and epithelial elements. It is assumed that vitamin B2, being a component of Warburg's respiratory enzyme, acts on cellular oxidation-reduction processes. (4 figures, 9 references) John J. Stern.

Ashton, N., and Hobbs, H. E. **Effect of cortisone on rheumatoid nodules of the sclera (scleromalacia perforans.)** Brit. J. Ophth. **36**:373-384, July, 1952.

Van der Hoeve in 1934 described scleromalacia perforans. It is a scleritis with yellow gray subconjunctival nodules and progressive scleral necrosis which goes on to perforation of the sclera. It is often associated with chronic articular disease. Histologically the nodules resemble the subcutaneous nodules of rheumatoid arthritis and are probably associated with some metabolic disturbance. A 41-year-old man is described who had this disease bilaterally and received cortisone both topically and systemically with almost immediate beneficial results. The ulcerous areas were filled in promptly. The improvement was not permanent, however; the ulcers later broke down again after withdrawal of the drug but again began to heal with a resumption of treatment. The patient died during treatment and one eye was obtained for histologic study. Sections showed shrinking of the nodules and scleral regeneration in the necrotic areas. (8 figures, 33 references)

Morris Kaplan.

Berliner, Milton L. **Cornea and sclera.** A.M.A. Arch. Ophth. **47**:250-267, Feb., 1952.

The literature pertaining to the cornea and sclera is reviewed for the latter part of 1950 and the first eight months of 1951. (126 references) George S. Tyner.

Braley, A. E., and Alexander, R. C. **Superficial punctate keratitis. The isolation of a virus.** Tr. Am. Ophth. Soc. **49**: 283-296, 1951.

Superficial punctate keratitis is a disease limited to corneal inflammation. From one patient with the disease a virus was isolated after repeated corneal scrapings and this virus produced a similar disease after corneal inoculation in rabbits. Patients with the disease have circulating antibodies which increase with remissions and decrease with attacks. Once the virus is isolated, it is stable. The virus appears to be very small. No inclusion bodies were found but intranuclear inclusions may be present. The killed virus produces a slightly positive skin reaction in patients with the disease. Therapy is unsatisfactory. David O. Harrington.

Donahue, Hugh C. **Congenital ectasia of the cornea.** A.M.A. Arch. Ophth. **48**: 154-160, Aug., 1952.

The clinical and pathologic findings in two cases of congenital ectasia of the cornea are reported. Prenatal inflammation seems the most probable cause. One eye was successfully treated by excising the ectatic area, suturing the defect and covering it with a conjunctival flap. In the other case treatment was limited to covering the area with a conjunctival flap. Buphthalmos and loss of the eye ensued. (21 references) George S. Tyner.

Haselmann, G., Pulfrich, K., and Haselmann, H. **The treatment of corneal epi-**

thelial damage with pantothenic acid. Ophthalmologica **123**:357-364, June, 1952.

Clinical observations and animal experiments suggest that the topical application of pantothenic acid (a nutritional factor of the vitamin B group, available in the form of its corresponding alcohol, panthenol [Bepanthen Hoffmann-LaRoche]) favors the regeneration and functional recovery of damaged corneal epithelium. Pantothenic acid is indicated in recurrent erosions, trophic ulcers, superficial punctate keratitis and in dendritic keratitis after the virus has been destroyed with iodine. (16 figures, 12 references)

Peter C. Kronfeld.

Lepri, Giuseppe. **Investigations of the adrenal cortex function and of ACTH and ascorbic acid therapy in rosacea keratitis.** Arch. di Ottal. **54**:109-134, May-Aug., 1950.

In two cases of long-standing rosacea keratitis, adrenal cortical insufficiency was demonstrated by checking the eosinophile count and the uric acid excretion after the intramuscular injection of 36 mg. of ACTH. In view of the relations between vitamin C and ACTH, a treatment employing both substances is recommended. In his cases, the author observed immediate subjective and objective improvement. Complete recovery cannot be claimed because of the well-known occurrence of remissions in this disease. (43 references)

John J. Stern.

Pascheff, C. **The morphologic terminology of true trachoma and its histologic significance.** Arch. d'opht. **12**:388-396, 1952.

Pascheff regards true trachoma as neither a lymphocytic infiltration nor an inflammatory granuloma, as has been claimed, but as a lymphofollicular hyperplasia of the lymphatic apparatus which leads to folliculoma formation. The giant granulations of conjunctival trachoma and of pannus sarcomatosus he considers folliculomas. He refers to trachoma as "conjunctivitis folliculomatosa" rather than as a lymphoma or plasmoma. (8 figures, 38 references)

Phillips Thygeson.

Ridley, F., and Smith, C. **Case notes: Leptotrichosis conjunctivae.** Brit. J. Ophth. **36**:328-329, June, 1952.

A case report of Leptotrichosis conjunctivae is presented. The organism, isolated from the suppuration of a preauricular gland, was strictly micro-aerophilic. The infection responded to aureomycin locally. (5 references)

Orwyn H. Ellis.

Rycroft, B. W., and Romanes, G. J. **Lamellar corneal grafts.** Brit. J. Ophth. **36**:337-351, July, 1952.

In such cases as conical cornea and deep corneal scars a full thickness graft is plainly indicated, while in epithelial dystrophies or superficial scars the lamellar graft is much more satisfactory. In comparing the two procedures, it was found that immediate infection had not occurred in either type but that a type of later infection did occur in the lamellar graft and was probably due to aerial infection, to lint or to talc from the gloves; as a consequence, gloves have been discarded for the operation. The half-thickness graft has the advantage in that an area of scar up to 10 mm. in diameter is easily replaced while in the through and through graft 6 mm. is the optimal size. The lamellar grafting exposes the eye to less risk and requires less skill. Opacification of the graft occurs less often in lamellar grafts and is an allergic reaction which is unpredictable but can probably be avoided or at least lessened by the routine use of antihistaminics postoperatively.

The technique used is that of Paufique and is the one of general choice. Penicillin drops are used locally for three days be-

fore operation and atropine is used before and during surgery. Egg membrane is sutured over the cornea and the dressing is not disturbed for one week. Cortone drops every hour are used routinely after the eighth day and it is felt that they have a profound and lasting effect in the prevention of vascularization. Sixty-two consecutive cases are described. The results were generally satisfactory. (5 figures, 3 references) Morris Kaplan.

Taboriski, Y. **Late trachoma bodies.** Ophthalmologica **123**:383-385, June 1952.

The author describes or, rather, redescribes granular inclusions in the epithelium of the bulbar conjunctiva which he has found in 90 to 95 percent of untreated trachomas of long standing. The granules measure 0.3 to 0.4 μ in size and take on a bluish-green color in Giemsa-stained specimens. They are thought to represent a late form of the agent causing trachoma. (3 figures, 5 references)
Peter C. Kronfeld.

8

UVEA, SYMPATHETIC DISEASE, AQUEOUS

Alexander, A., Baer, A., Fair, J. R., Gochenour, W. S., Jr., King, J. H., Jr., and Yager, R. H. **Leptospiral uveitis.** A.M.A. Arch. Ophth. **48**:292-297, Sept., 1952.

Uveitis has been recognized as a sequel of leptospiral infection since the time of Weil. In the majority of cases reported, iritis, iridocyclitis, and chorioretinitis appeared between the first and sixth month after systemic infection. In this case infection occurred in a laboratory worker after splashing a culture of leptospira in his left eye. General symptoms appeared in 12 days, and uveitis in 51 days. Cultures from the blood and aqueous were positive. Antibiotics such as chloramphenicol and streptomycin were ineffective in treatment; however, artificial fever and cycloplegics were beneficial. The authors advise paracentesis of the anterior chamber for both diagnosis and treatment. (16 references). R. W. Danielson.

Haik, G. M., Lyda, W., and Waugh, R. L. **Iridoschisis.** A.M.A. Arch. Ophth. **48**:40-43, July, 1952.

The authors contribute the fourteenth report of a case of iridoschisis. In their opinion the condition arises as a result of vascular occlusion. George S. Tyner.

Heath, P. **Tumors of the iris muscle.** Tr. Am. Ophth. Soc. **49**:147-166, 1951.

The histopathology of a group of 19 neuroectodermal tumors of the iris is reported. The frequency of these tumors in a large series of primary and secondary newgrowths in the iris is 4.34 percent. A classification by histologic types is given. The nature, differences, and common properties of growths originating from the neuroectodermal muscles of the iris and the management of these tumors is discussed. David O. Harrington.

Hedges, T. R., and Taylor, G. W. **Uveal and vestibuloauditory disease with sarcoid.** A.M.A. Arch. Ophth. **48**:88-89, July, 1952.

A case of biopsy-proven Boeck's sarcoid is reported because the symptoms and signs were those of Harada's disease, namely, deafness, tinnitus, vertigo and bilateral uveitis. The probable relationship of the two diseases is emphasized.
George S. Tyner.

Hilding, A. C. **Syndrome of cartilage pathology, destructive iridocyclitis, multiple joint dislocations.** A.M.A. Arch. Ophth. **48**:420-427, Oct., 1952.

This is a review of the pertinent literature and a case report of a 61-year-old white woman exhibiting the syndrome named in the title and the first report of ocular and joint disease coincident with involvement of cartilage outside of the

joints. The essential findings were uveitis with blindness, widespread rheumatoid arthritis, deafness, atrophy of the cartilages of the nose and concha of the pinna. Multiple joint dislocations were present because of softening and laxity of joint cartilages. Laboratory and roentgenologic studies revealed no specific cause. (4 figures, 20 references)

George S. Tyner.

Kapuściński, W. J., Jr., and Ogielska, E. **The influence of typhoid vaccine on the cytologic formula of the aqueous in uveitis.** Arch. d'opht. **12**:397-404, 1952.

The authors refer to their many previous studies on typhoid vaccine in uveitis during the past few years and offer a continuation study in an effort to determine whether the principal defense mechanism in uveitis is humoral or cellular. In this study they have noted changes in the cellular composition of the aqueous, both in normal controls and in uveitis after injections of the vaccine. The punctures were repeated three or four times at three or four-day intervals during the period of therapy with increasing doses of the vaccine. Eyes showing improvement had increasing numbers of monocytes and histiocytes as compared to the number of neutrophils and lymphocytes, while in the unimproved the neutrophils and lymphocytes tended to increase more than the cells of local tissue origin. On this evidence they conclude that tissue defenses are more important in uveitis than humoral ones. The authors discuss the various theories of etiology of uveitis and state their opinion that the vast majority of cases are due to focal infection. (14 references)

Phillips Thygeson.

Laval, Joseph. **Benign pigment-epithelium tumor of the iris.** A.M.A. Arch. Ophth. **48**:66-74, July, 1952.

This case is reported because of the rarity of tumors arising in the pigment epithelium of the iris. The tumor proved to be benign and the author suggests that whenever solid, black tumors arise in ocular tissues which have a layer of pigment epithelium, one must consider the benign form of tumor before advising enucleation. Photomicrographs of this and similar tumors are shown.

George S. Tyner.

Lodato, Guiseppe. **Report of a case of spontaneous disinsertion of the iris.** Gior. ital. oftal. **4**:120-124, March-April, 1951.

A case of spontaneous iris disinsertion secondary to symptomless stromal atrophy of this structure is reported. (8 references)

J. J. Lo-Presti.

Rádnót, M. **Sympathetic ophthalmia.** Szemészet **3**:119-124, 1952.

The present status of the problem is discussed on the basis of nine cases worked up clinically and histologically. Sympathetic papillitis was more frequently seen than it was expected from published experience. Presumably it is often obscured by the severe inflammation of the uvea. In the early stage local cortisone therapy is the most appropriate procedure.

Gyula Lugossy.

Reese, A. B. **Association of uveal nevi with skin nevi.** A.M.A. Arch. Ophth. **48**: 271-275, Sept., 1952.

The word nevus was originally used loosely to designate almost any type of the so-called birthmark. It is now generally believed that the term should be restricted to lesions composed of so-called nevus cells. Most pathologists accept the Masson theory that nevus cells are modified Schwann cells, abortive attempts to form sensory end-organs. There is a close relationship between the nevus and the neurofibroma. The author points out the most infrequent association of nevi in the iris with ipsilateral nevi in the skin. Four

cases are presented in which elevated, rather well-localized, pigmented tumors occurred in the periphery of the iris in association with nevi in the skin predominantly on the same side of the face. Reese suggests that in such cases the melanoma in the iris is apt to be a nevus. The majority of such lesions will, in all probability, never become malignant, and if they can be frequently observed for evidence of growth, excision may be deferred. (1 color plate, 2 figures, 10 references) R. W. Danielson.

Wilder, Helenor C. **Toxoplasma chorioretinitis in adults.** A.M.A. Arch. Ophth. **48**:127-136, Aug., 1952.

This is an amplification of a preliminary report which appeared in the A.M.A. Archives of Ophthalmology 47:425, 1952. Fifty-three adult eyes are reported which showed granulomatous chorioretinal lesions containing organisms morphologically identical to Toxoplasma. The patients were from 14 to 83 years of age, predominantly male and the lesions were uniocular except in three patients. The lesions had characteristics which could be confused with tuberculosis. There have been no previous pathologic reports of Toxoplasma in adult eyes. (9 figures, 13 references) George S. Tyner.

9

GLAUCOMA AND OCULAR TENSION

Arató, I. **Results of 100 angiodiathermy operations in five years.** Szemészet **2**:58-61, 1952.

In 100 angiodiathermy operations done in five years the procedure was followed by permanent normalization of tension. No complications were observed. The operation represents a lesser trauma for the eye than cyclodialysis. It can be performed in an outpatient clinic. The results are less good in the absolute stage or when tension is above 40 or 50 mm. Hg. As a completing operation it may be applied in chronic inflammatory glaucoma. Gyula Lugossy.

Arató, I., and Arató, M. **Cholinesterase activity in serum and aqueous of glaucomatous patients.** Ophthalmologica **123**: 374-382, June, 1952.

The cholinesterase activity of body fluids is determined by measuring the in vitro rate of breakdown of acetylcholine in the presence of the particular body fluid. Tested in this manner aqueous samples from glaucomatous as well as from human control eyes showed no cholinesterase activity. The sera of the glaucomatous patients contained very considerable amounts of nonspecific cholinesterases, but not as much as the sera of the normal controls. The authors assume that the activity of the parasympathetic is lessened in glaucoma. The real significance of the acetylcholine-cholinesterase system in glaucoma can only be determined by quantitative measurements of both of these factors in the ocular tissues. (34 references) Peter C. Kronfeld.

Farkas, K., and Vermes, E. **The effect of histamine on ocular tension.** Szemészet **1**:27-29, 1952.

Both the administration of histamine and Trueta's experiment resulted in a marked increase of ocular tension in dogs and rabbits. Considerable dilatation of the vessels of the ciliary plexus and the ciliary process, as well as the accumulation of india ink in the plexus region, were demonstrated. Presumably, the increase of ocular tension is partly due to histamine. Gyula Lugossy.

Kronfeld, Peter. **Tonography.** A.M.A. Arch. Ophth. **48**:393-404, Oct., 1952.

The author defines, reviews and discusses the subject of tonography. A report of his experiences with tonography in normal and glaucomatous eyes is included. Essentially tonography is a procedure for

observing and recording the drop in ocular tension which occurs during prolonged application of a tonometer to the cornea. From the information thus obtained a "coefficient of facility of outflow" from the eye can be calculated according to the method of Grant. This is an indication of the rate of flow of fluid from the eye. The fluid lost is most likely aqueous, but expulsion of blood from the uveal tract has not yet been excluded as a cause for the fall in tension.

Kronfeld's observations correspond to those of Grant. The coefficients obtained in normal eyes differ from those obtained in eyes with early, chronic simple glaucoma. Diseased eyes show a lower coefficient of outflow than normal eyes. The lower limit of normal is in the neighborhood of 0.14. Forty undiseased eyes observed by Kronfeld showed a coefficient of outflow from 0.14 to 0.599. Thirty from eyes with early glaucoma showed coefficients from 0.049 to 0.199. Tonography holds promise as a diagnostic procedure for chronic simple, wide-angle glaucoma and is a means to study the normal as well as pathologic physiology of the eye. (3 figures, 19 references)

George S. Tyner.

deRoetth, A., Jr., and Knighton, W. S. **Clinical evaluation of the aqueous-flow test.** A.M.A. Arch. Ophth. **48**:148-153, Aug., 1952.

The authors applied the aqueous-flow test of Grant as a clinical test for glaucoma. They do not feel that it supplants the older clinical diagnostic tests. The aqueous-flow test was found useful only in chronic simple glaucoma. (4 figures, 3 references) George S. Tyner.

Weekers, R., and Delmarcelle, Y. **Pathogenesis of intraocular hypertension in cases of arteriovenous aneurysm.** A.M.A. Arch. Ophth. **48**:338-343, Sept., 1952.

Ocular hypertension is frequently found in patients with aneurysms of the cavernous sinus and internal carotid artery. The authors found it in five cases recently examined and report one in which newer diagnostic procedures were used such as measurement of the episcleral venous pressure, measurement of the resistance to the aqueous flow, and calculation of the volume of this flow. They ascribed the hypertension to increased episceral venous pressure. (4 figures) R. W. Danielson.

Weekers, R., and Prijot, E. **The measurement of the resistance to aqueous outflow by means of the electronic tonometer. Part three: observations on glaucomatous eyes after retrociliary diathermy operations.** Ophthalmologica **123**:365-373, June, 1953.

This is a tonographic study of 27 cases of chronic simple glaucoma after normalization of the ocular tension by means of Weekers' retrociliary diathermy operation. The typical ("standard") operation consists of 20 to 24 transconjunctival applications of diathermy to points 7 to 9 mm. back of the limbus. The applications are made with a flat, thermoelectric, that is thermometer-connected, electrode of .75 mm. diameter which permits accurate control of the amount of heat conveyed to the tissues. Each application lasts 15 seconds during which the temperature is kept at 90° C.

Tonography of eyes operated upon successfully revealed no change in the facility of outflow (Grant's coefficient) or its reciprocal, the resistance to outflow. In the same eyes the author also made measurements of the pressure in the episcleral veins and found no appreciable drop after the operation. The conclusion is drawn that the principal cause of the drop of ocular tension after Weeker's operation is a reduction of the rate of aqueous flow, that is, aqueous production. As a rule this drop in tension amounts to about 50 per-

cent of the average pressure before the operation. Eyes with average pressures above 40 mm. are not well suited for retrociliary diathermy. Residual states of hypertension after iridencleisis, not exceeding 40 mm., usually respond well to retrociliary diathermy. Repeated diathermy operations create a predisposition to cataract formation. (16 references)

Peter C. Kronfeld.

10

CRYSTALLINE LENS

Callahan, Alston. **Cataract extraction after glaucoma surgery: lateroinferior approach following filtering glaucoma operation.** A.M.A. Arch. Ophth. **47**:132-140, Feb., 1952.

This article presents the author's experience with a difficult problem often confronting ophthalmologists. A discussion of the various methods of extracting a cataractous lens in an eye which has previously undergone an antiglaucoma filtering operation is followed by a description of the author's technique with excellent drawings. The author prefers a lateroinferior approach in order to avoid interference with the filtering bleb. The most common postoperative disadvantage of this approach is corneal opacification.

George S. Tyner.

Coles, R. S., and Laval, J. **Retinal detachments occurring in cataract associated with neurodermatitis** A.M.A. Arch. Ophth. **48**:30-39, July, 1952.

A case of bilateral cataract with neurodermatitis (atopic cataract) is reported. The authors point out that the percentage of unfavorable surgical results in reported cases is 36 percent. The postoperative course is complicated most commonly by retinal detachment and a severe iridocyclitis. Most extractions are extracapsular or discissions. The authors believe that the cause of the retinal detachment is a diseased vitreous. They suggest careful preoperative examinations of the fundus for evidence of disease of the vitreous or retina. Needling followed by linear extraction is advocated if the patient is under 30 years of age. George S. Tyner.

Fralick, F. B., and Fox, R. M. **The results of cataract extraction in cases of complicated cataracts.** Tr. Am. Ophth. Soc. **49**:133-146, 1951.

The results of cataract extraction in 257 eyes with complicated cataracts are reviewed. In 62 percent the visual acuity was 6/9 or better and in 38 percent it was 6/12 or less; in 34 percent of eyes with associated disease it was 6/9 or better and in 66 percent 6/12 or less. When metabolic disease was associated with cataract 69 percent had 6/9 or better and 31 percent had 6/12 or less. When only the complicated subcapsular cataract was encountered the percentage of patients with vision of 6/9 or better rose to 89 percent. The complications are the same as in uncomplicated cataracts but more frequent and severe. David O. Harrington.

Hill, H. F. **Report on a series of 401 cataract extractions with special reference to the keratome-scissors incision.** Tr. Am. Ophth. Soc. **49**:109-131, 1951.

Hill believes that the keratome-scissors incision is preferable to the knife incision, and many of the complications can be avoided if the same careful technique and sharp instruments are used that would be insisted upon in performing the Graefe knife incision.

Complications sometimes attributed to the keratome-scissors section are probably chiefly due to other factors of technique such as: 1. undue trauma with deep sutures, 2. poor selection and care of scissors, and 3. poor technique in use of scissors. In favor of the keratome-scissors incision are: 1. ease of insertion of very closely approximated sutures and less danger of cutting the suture; 2. a larger

and better conjunctival flap can be prepared; 3. keratome incision can be more accurately placed; 4. the wound can be beveled as desired; 5. the wound heals quickly and the author had less delayed chamber formation than with the Graefe incision; and 6. incidence of post-operative hyphema is less. David O. Harrington.

von Sallmann, L. **Further efforts to influence X-ray cataract by chemical agents.** Tr. Am. Ophth. Soc. **49**:391-417, 1951.

Intravenous injection of cysteine had a protective action against radiation damage to the lens and hair follicles of rabbits when treatment preceded exposure of the eye to 1500 v. This protection persisted for at least one year. Subconjunctival injection of cysteine after irradiation did not reduce the corneal opacities. Subconjunctival injection of cysteine before irradiation was moderately beneficial. All microscopic lens lesions were less pronounced in cysteine-pretreated eyes than in eyes rayed before the use of cysteine. Other chemical agents used were less effective or ineffective. David O. Harrington.

Vail, Derrick. **Zonule membrane and cataract expression.** A.M.A. Arch. Ophth. **48**:405-413, Oct., 1952.

The author discusses the development and anatomy of the zonular membrane in relationship to cataract extraction. In the tumbling method of intracapsular cataract extraction, the eye should be soft. The lower pole of the lens should be tilted upwards toward the cornea and rotated slightly from side to side. Counterpressure should be exerted backward and down through the cornea just in front of the limbus. As the lens is tumbled, the cornea should be "tucked" under it. If this procedure is followed the capillary attraction of the hyaloid fossa is abolished, any existing adhesions between the hyaloid membrane and the posterior lens capsule are broken, and the zonular membrane is put on a stretch and "peeled" from the capsule. A brief but lucid description of the embryology and anatomy of the zonule and the reasoning in support of the extraction procedure is included. (26 references) George S. Tyner.

11

RETINA AND VITREOUS

Beauvieux, J., Julien, R. G., and Chabot, J. **A case of obliteration of the central artery of the retina.** Arch. d'ophth. **12**:381-387, 1952.

The authors report the case of a 27-year-old woman in whom occlusion of the central artery of the right eye was the accident which led to the recognition of a severe arterial hypertension. The patient had concomitant retinal arteriolosclerosis and renal and peripheral arteriosclerosis. She had recently had an uncomplicated pregnancy. Her blood pressure was 240/130. On the basis of this case the authors discuss the ocular signs of arterial hypertension with special reference to classification and prognosis. They favor a classification including four anatomo-clinical stages of which the first is disturbed function, without pathologic changes in the vessel walls; the second is the stage of benign sclerosis; the third is the stage in which there is evidence of increased permeability of the vessels with hemorrhages and exudates; and the fourth is the stage of malignant sclerosis and is terminal; its most distinguishing sign is edema of the disc with exudative neuroretinitis. They conclude that their patient should be classified as stage three. (7 references) Phillips Thygeson.

Brown, C. A., and Corner, B. **Retrolental fibroplasia. Early development and the effect of ACTH in treatment.** Brit. J. Ophth. **36**:281-302, June, 1952.

The author reviews the literature on retrolental fibroplasia and reports four cases in which treatment was applied and

12 additional ones which were observed. All of the infants had a birth weight of four pounds six ounces or less. This is an incidence of 3.7 percent for babies of this weight. When all babies of this weight range were examined ophthalmoscopically the incidence rose to 7 percent. The gestation period of all cases was between 30 and 34 weeks. The etiologic factors postulated by various authors are discussed. They are hyaloid hyperplasia, vitamin deficiency, oxygen toxicity and hormone deficiency. The first two have been practically discarded and the latter two need more investigation.

The clinical course is described in detail. In the acute stage the preliminary signs are dilatation and tortuosity of the retinal vessels. These changes may be reversible. Later developments are the formation of new vessels and subretinal edema. The disease appears to act simultaneously on both retinal and choroidal circulations. The chronic stage consists of organization and fibrosis with cicatrization. Treatment during the advanced stages has been fruitless. In four cases the early signs of progressive retrolental fibroplasia, subretinal edema and new vessel formation, were present before the beginning of treatment. ACTH checked development of the condition in three of four cases. The edema and the formation of new blood vessel were inhibited. In two cases acute exacerbation of the disease occurred when treatment was stopped and subsequent reinstitution of the treatment controlled the condition. The four treated cases are reported in detail. (8 figures, 2 color plates, 28 references) Orwyn H. Ellis.

Chandler, P. A. **Diagnostic and prognostic implications of vitreous opacities.** Tr. Am. Ophth. Soc. **49**:351-363, 1951.

Vitreous opacities are of four main types: degenerative, inflammatory, neoplastic and hemorrhagic. From a critical analysis of the type of onset and the character of the opacity, valuable clues can be obtained for the diagnosis and prognosis of certain ocular diseases. Those vitreous opacities seen in association with retinal breaks with and without detachment are of special importance.

David O. Harrington.

Crosse, V. M., and Evans, P. J. **Prevention of retrolental fibroplasia.** A.M.A. Arch. Ophth. **48**:83-87, July, 1952.

The authors are of the opinion that the real source of retrolental fibroplasia lies in the prolonged use of high oxygen concentrations in the early life of premature infants. Data compiled from the hospitals in Birmingham, England, is offered in support of this contention. These data indicate that the incidence and severity of the disease is in proportion to the prolonged use of high concentrations of oxygen. The authors advocate the use of ACTH in established cases to check the progress of neovascularization. G. S. Tyner.

Culler, A. **Fundus changes in leukemia.** Tr. Am. Ophth. Soc. **49**:445-473, 1951.

Hemorrhages in the retina occur as a result of anemia and thrombocytopenia and are usually part of the same process which results in the typical leukemic nodule. Histologic studies show evidence of venous obstruction by perivascular infiltrates even in lympatic leukemia. Intraocular pressure may provide more obstacles to an already sluggish blood stream. After leucocytic infiltrates have once formed in the retina, proliferation and further venous embarrassment may occur. A series of 144 patients statistically studied showed retinal hemorrhages in 48 percent but this high incidence was not correlated with any factor in the blood picture, except possibly low red and platelet counts. David O. Harrington.

Friedenwald, J. S., Owens, W. C., and Owens, E. U. **Retrolental fibroplasia in**

premature infants, III. The pathology of the disease. Tr. Am. Ophth. Soc. **49**:208-234, 1951.

The pathologic morphology of retrolental fibroplasia in premature infants is characterized by the proliferation of the capillary endothelium with abnormal budding of the capillaries in the nerve-fiber layer of the retina. Surrounding the capillary proliferation are increased numbers of glial cells. Small areas of edema and hemorrhage may occur in the thickened nerve-fiber layer. With further progression, small preretinal and vitreous hemorrhages occur, the newly formed capillaries break through the internal limiting membrane and extend over the surface of the retina and into the vitreous accompanied by a delicate network of fibrous tissue. Retinal detachment follows and a retrolental membrane is formed by the fusion of detached retinal folds.

David O. Harrington.

Locke, J. C., and Reese, A. B. **Retrolental fibroplasia.** A.M.A. Arch. Ophth. **48**:44-47, July, 1952.

The authors report a series of clinical, experimental, monocular and binocular occlusions, in premature infants which suggest that the instillation of mydriatics, premature exposure of the eyes to light and handling of premature babies for routine ophthalmoscopic examination are not factors in the production of retrolental fibroplasia. G. S. Tyner.

Lodato, Giuseppe. **Experimental pigment degeneration of the retina in rabbits subjected to Filatov therapy.** Gior. ital. oftal. **4**:125-131, March-April, 1951.

Experimental pigment degeneration of the rabbit retina induced by injections of sodium iodate intravenously is modified to only a slight extent by implantation of placenta (Filatov) or uvea and retina previously poisoned with sodium iodate. The lesion appeared after four injections instead of the usual three and the process appeared to be less intense. The author presents four histological sections in support of his clinical observations. (4 figures, 15 references) J. J. Lo-Presti.

Rubinstein, Kazimierz. **Mechanism of retrolental fibroplasia.** Brit. J. Ophth. **36**: 303-312, June, 1952.

Our knowledge of retrolental fibroplasia is surveyed. The clinical picture is described as follows: at three to four weeks of age engorgement of the retinal vessels, retinal edema, and vitreous clouding, begin, then retinal detachment occurs, the membrane approaches the posterior surface of the lens, posterior synechiae develop and growth of the eye ceases. About six weeks from onset of these changes, the eye enters the final cicatricial stage.

The literature on the histopathology is reviewed. Retinal edema and endothelial proliferation characterize the first stage, then capillaries proliferate and produce retinal detachment. The retrolental membrane appears to be inflammatory. The detachment involves the oral and even the ciliary part of the retinal epithelium. The retinas are in the fetal stage and show attempts at rosette formation. There are no hyaloid remnants. The author advances an hypothesis of pathogenesis which is based on the assumption that a precocious closure of the hyaloid artery occurs. In an attempt to establish circulation, retinal edema and new bloodvessels are developed. The anterior parts of the eye degenerate because of ischemia, and in consequence a cyclitic inflammatory membrane is formed. (33 references)

Orwyn H. Ellis.

Simpson, G. V. **Pieces of retina in the vitreous.** Tr. Am. Ophth. Soc. **49**:75-89, 1951.

Three cases are reported, each of which

presented a hole in the easily visible portion of the retina and later the torn piece of retina was seen in the vitreous. The ophthalmoscopic appearance of this fragment of retina is identical with a floater which occurs as part of an acute visual disturbance. Simpson suggests that the floaters are pieces of retina which have dropped into the vitreous from the retina near the ora serrata. Recovery is satisfactory without treatment but an explanation of the nature of the disturbance will relieve the patient's uneasiness.

David O. Harrington.

Smith, Redmond. **Suprachoroidal air injection for detached retina.** Brit. J. Ophth. **36**:385-388, July, 1952.

Following the evacuation of the subretinal fluid after diathermy repair of retinal detachment, the eye may regain its shape and tension either by a reformation of the subretinal fluid which reproduces the detachment or by a rapid production of aqueous. Apparently both these processes occur at the same time and the detachment is cured or recurs depending on the apposition of the retina to the choroid and how much adhesion exists between the two. Whether the new subretinal fluid remains or is absorbed depends on how much of a barrier is set up to prevent its absorption.

The injection of air within the globe is a logical means of forcing closer apposition between retina and choroid. If air is injected within the vitreous, it might well damage the vitreous as well as obscure the fundus view. It was therefore decided to inject it within the suprachoroidal space on the opposite side of the globe from the diathermy punctures. In four cases this was done; the 1.5 cc. of air caused a combined choroidal and retinal detachment which resulted in good apposition of the previously detached retina. In the four cases of poor prognosis it was felt that unquestioned benefit was obtained in two and that the procedure merited more trials. (2 figures, 3 references)

Morris Kaplan.

Stallard, H. B. **Comparative value of radium and deep X-rays in the treatment of retinoblastoma.** Brit. J. Ophth. **36**:313-324, June, 1952.

The results in a series of cases of retinoblastoma treated with radon seeds and radium discs are compared with other reported series using radon seeds, needles, or deep X rays. A radium disc applicator is presented which obviates much of the difficulty of the application of other forms of radon or radium. These are available in discs from 2 to 20 mm. in diameter. The 5 and 10 mm.-discs are the ones more commonly used. There are many difficulties with the application of X rays to children. It is concluded that when one third or less of the retina is involved there is reasonable hope that the neoplasm will be destroyed by irradiation. Results are usually bad when more is involved. In advanced cases enucleation should be done. The radium discs more effectively apply the irradiation and the complications from long-range shooting with heavy doses are considerably less. The results in the author's series are considerably better than other series with other types of treatment. (9 figures, 34 references)

Orwyn H. Ellis.

Swan, K. C., and Raaf, J. **Changes in the eye and orbit following carotid ligation.** Tr. Am. Ophth. Soc. **49**:435-444, 1951.

The ocular and orbital findings in eight patients with carotid-cavernous sinus communication is reviewed. In addition to the usual signs, elevated ocular tension was found in five or six patients. Glaucoma may be an important factor in causing blindness in untreated eyes. Five of six patients were treated by simultaneous ligation of external and common carotid arteries. All were relieved of major symp-

toms. Postoperatively there was hypotony and diminished volume and pulsation of the retinal arteries. In three patients a striking retinopathy developed postoperatively and then gradually cleared. The pathogenesis of this retinopathy is discussed. David O. Harrington.

12

OPTIC NERVE AND CHIASM

Benton, C. D., and Harris, J. F. **Syphilitic optic nerve atrophy treated with penicillin.** A.M.A. Arch. Ophth. **48**:449-454, Oct., 1952.

Arrest of progressive visual loss in patients with luetic optic atrophy was obtained by the use of 4.8 to 6 million units of penicillin, when the initial visual acuity was 20/50 or better. Patients with initial visual acuity of less than 20/50 continued to lose vision despite treatment with 6 to 18 million units of penicillin. (3 figures, 9 references) George S. Tyner.

Boros, B. **Ocular findings in a one-day-old newborn infant having brain injury.** Szemészet **1**:36-38, 1952.

In a newborn infant the brain was damaged because a drug enhancing uterine contraction was administered at the onset of labour and the too energetic contraction resulted in a cerebral hemorrhage. The infant died of pneumonia. The most striking alteration was found in the optic nerve, one part of which was destroyed as in optico-malacia.

Gyula Lugossy.

Druault-Toufesco, S. **Prepapillary formations.** Arch. d'opht. **12**:415-416, 1952.

In commenting on an article by Adamantiadis (Arch. d'opht. 5:457, 1951), the author stresses the importance of French studies on the structure and development of the vitreous, the zonule, the canal of Cloquet, and the prepapillary hyaloid remnants. He quotes in some detail from the work of A. Druault (Arch. d'opht. Nov., 1937, p. 967) on the visualization of hyaloid remnants and notes that this may occur suddenly, especially during the age period between 45 and 60 years. He discusses the various theories of the mechanism by which these formations become visible to the patient and notes that their form is extremely variable; four main types are seen and of these the annular is the rarest. The author concludes by describing his own case in which the remnant became visible in his left eye suddenly and was accompanied by phosphenes. (4 figures) Phillips Thygeson.

Tower, Paul. **Congenital prepapillary cyst.** A.M.A. Arch. Ophth. **48**:433-435, Oct., 1952.

This is a case report of a nine-year-old white boy in whom a prepapillary cyst was first recognized at the age of five years. Vision was limited to finger counting in the affected eye. The other eye was normal. There was no associated anomaly elsewhere in the body. Such cases present a diagnostic problem and must be differentiated from glioma of the optic nerve, retinal detachment, Bergmeister papilla, parasitic infestation and granulomatous disease. (1 figure, 16 references)

George S. Tyner.

13

NEURO-OPHTHALMOLOGY

Esente, Ivan. **Eye changes in the course of suboccipital and ventricular antibiotic therapy for tuberculous meningitis.** Gior. ital. oftal. **4**:100-107, March-April, 1951.

Without reference to the number of cases observed, disturbances of motility, associated binocular movements, primary optic atrophy, and hemorrhagic retinopathy which occur during the course of streptomycin and para-amino-salicylic acid treatment through the suboccipital and ventricular routes are discussed. The optic atrophy, either vascular or degen-

erative in nature, and the hemorrhagic retinopathy, due to alteration in the blood or vascular permeability, are ascribed to toxic doses of the antibiotic. Nystagmus occurred in all of the patients. Vasospasm is not a factor in the production of any of the disturbances reported. (18 references)

J. J. Lo-Presti.

Fisher, Miller. **Transient monocular blindness associated with hemiplegia.** A.M.A. Arch. Ophth. **47**:167-203, Feb., 1952.

This is a convincing article with six case histories and one necropsy report. A heretofore unrecognized syndrome consisting of repeated attacks of transient monocular blindness followed by or associated with contralateral hemiplegia is described. The syndrome is evidently the result of occlusion of the cervical portion of the internal carotid artery on the side of the affected eye. George S. Tyner.

Wortham, E., Levin, G., and Wick, H. W. **Altitudinal anopsia following thoracoplasty.** A.M.A. Arch. Ophth. **47**:248-249, Feb., 1952.

Anoxia of the superior lip of the calcarine fissure is suggested as the probable cause of a bilateral inferior altitudinal anopsia following a second stage thoracoplasty. Several possible contributory factors are cited. George S. Tyner.

14

EYEBALL, ORBIT, SINUSES

Czukrász, I. **Operation of a detached nasoorbital encephalocele.** Szemészet **2**: 62-65, 1952.

A nutsized cystic tumor, removed from the inferior nasal part of the orbit, was found to be an encephalocele after histologic examination. Preoperative diagnosis could not be made by puncture. In tumors arising at this place, encephalocele is always to be considered, even if no defect is seen in the nose and orbit. The author starts the incision through the inferior fold, the wound is closed with ease, is invisible, and post-operative infection is unlikely. Gyula Lugossy.

Davenport, R., and Smith, C. **Panophthalmitis due to an organism of the B. subtilis group.** Brit. J. Ophth. **36**:389-392, July, 1952.

Numerous cases of panophthalmitis due to a member of the B. subtilis group have been reported and all were fulminating, the onset of symptoms occurring within six to 24 hours after injury to the globe. In the case herein described, a young Lebanese received a small penetrating intraocular foreign body. The injury was followed by very rapid and fulminating infection within the eye which was removed by evisceration two days later. Cultures showed an aerobic spore-bearing organism which was gram-negative, mobile and not capsulated. The organism was identified by rat innoculation as B. cereus, one of the B. subtilis group. It is remarkable that with the tremendous numbers of intraocular foreign bodies, this infection is rare and the possible reasons for the rarity are discussed. (10 references)

Morris Kaplan.

Fralick, F. B. **The orbit.** A.M.A. Arch. Ophth. **48**:362-385, Sept., 1952.

In this annual review of the literature on the orbit, the author comments on the publications of 1951. R. W. Danielson.

Sapuppo, Concetto. **Primitive carcinoma of the orbit.** Gior. ital. oftal. **4**:108-113, March-April, 1951.

The author found only two other cases of primary orbital carcinoma reported previously. The clinical and pathologic description of this basal cell carcinoma is the third reported. (3 references)

J. J. Lo-Presti.

15

EYELIDS, LACRIMAL APPARATUS

Azzolini, U. **Vegetating pyodermatitis of the eyelid.** Gior. ital. oftal. **4**:81-85, March-April, 1951.

A case of vegetating pyodermatitis of the lid is presented. It was resistant to local and general antibiotic and chemotherapy but responsive to two applications of radiant energy of 150 r. The histopathology of the lesion is described and compared with other granulomatous lid lesions. (2 figures, 2 references)

J. J. Lo-Presti.

Berke, R. N. **A simplified Blaskovics operation for blepharoptosis.** Tr. Am. Ophth. Soc. **49**:296-350, 1951.

This paper, which presents a simplified ptosis operation for resection of the levator muscle, should be read in its entirety. It is beautifully illustrated both as to surgical technique and "before and after" results. The success of the operation depends on achieving overcorrection at the time of the first dressing. Permanent overcorrection was rare. Failure results from inadequate resection, poor levator tissue and pulling out of sutures. The operation gives best results in patients with good levator action and normal superior rectus muscles. David O. Harrington.

Blankstein, S. S. **Dacryocystorhinostomy in infants and children.** A.M.A. Arch. Ophth. **48**:322-327, Sept., 1952.

Blankstein states that it is rare that a chronic dacryocystitis in infants cannot be relieved by probing. However, he believes that in some cases even in infancy the operation of dacryocystorhinostomy is indicated. He reports its successful use in three cases. In one, there was acute bilateral phlegmonous dacryocystitis at birth, followed by bilateral chronic inflammation and unilateral lacrimal fistula. In the second, there was acquired chronic dacryocystitis of unknown origin and in the third, probably an anomaly of the bones contiguous to the lacrimal sac and nasolacrimal duct. The method of Dupuy-Dutemps was used. (13 references) R. W. Danielson.

Cowan, Thomas W. **Adenocarcinoma of the lid, secondary to adenocarcinoma of the stomach.** A.M.A. Arch. Ophth. **48**:496-497, Oct., 1952.

The author reports the unusual occurrence of a lid lesion resembling a chalazion which was found to be a metastatic lesion from an adenocarcinoma of the stomach. Photomicrographs of the primary and metastatic lesion are included. (3 figures)

George S. Tyner.

Pereyra, Lorenzo. **Stevens-Johnson syndrome: its relation to erythema multiforme and pemphigus.** Gior. ital. oftal. **4**:132-149, March-April, 1951.

After reporting a case of this syndrome and discussing the differential diagnosis of Stevens-Johnson syndrome, erythema multiforme and essential shrinking of the conjunctiva, the author comes to the following conclusions: 1. these conditions are only different varieties of a single entity (infectious dermato-stomato ophthalmitis of Lunedei); 2. different forms merge one into the other with only slight differences (the lesion in the skin is predominant in erythema multiforme, that in the mucous membrane in Stevens-Johnson syndrome); 3. the histologic picture of the conjunctiva is not characteristic in any way; and 4. the type and location of the associated lesions seem to indicate the importance of vitamin deficiency especially of the B group. J. J. Lo-Presti.

Scott, G. I. **Operative treatment of congenital ptosis.** Brit. J. Ophth. **36**:362-372, July, 1952.

It is stressed that the levator muscle has three separate and distinct insertions;

there are several bands spreading out into the skin, a very narrow band is attached to the upper conjunctival fornix, and a third band, Müller's muscle, is attached directly to the tarsal plate. The operative procedure herein described is a modification of the Blaskovics procedure for advancement and resection of the levator. In 20 of 25 consecutive cases correction was satisfactory; in two a definite undercorrection will make a second operation necessary. (12 figures, 23 references)

Morris Kaplan.

Weizenblatt, Sprinza. **Primary calculus of the lacrimal sac.** A.M.A. Arch. Ophth. **48**:61-65, July, 1952.

A case of radiopaque calcium calculus of the lacrimal sac in a 28-year-old white woman is reported. The diagnosis was missed preoperatively because X-ray studies were made after lipiodol was injected and the outline of the calculus was misconstrued as that of contrast media. X-ray studies before and after instillation of contrast media are suggested.

G. S. Tyner.

16
TUMORS

Christensen, L., and Anderson, E. D. **Aberrant intraocular adenomata and epithelization of the anterior chamber.** A.M.A Arch. Ophth. **48**:19-29, July, 1952.

The authors report a case of congenital adenomatous tumor in the sclera and anterior uvea. The patient was a new-born infant whose eye was enucleated because of a cystic mass which filled the anterior chamber of the left eye. Photomicrographs are included. The authors conclude that the tumor was a cystic dilatation of an aberrant lacrimal gland duct.

George S. Tyner.

Cometta, F. **Lymphoma or lymphosarcoma of the conjunctiva?** Arch. d'opht. **12**:405-413, 1952.

Cometta reports a case of a lymphoid type of tumor involving the bulbar and palpebral conjunctiva of a 63-year-old farmer in which it was particularly difficult to make a clinico-pathologic differentiation between benignity and malignancy. The tumor had produced an exophthalmos of 5 mm. and the globe was displaced downward about 3 mm. Examination of the blood showed a normal count throughout. Histologic examination of the excised tumor showed that it was of lymphoid origin without giant cells or follicle formation. A silver stain for argyrophilic reticulum fibers revealed only traces. The patient was given 13 treatments with X rays to the orbit and six to the right temple (a total dosage of 2,600 r) and the tumor completely disappeared. No recurrence developed during a five-year observation period. The author then discusses the nature of the tumor as related to the histopathologic pictures of lymphocytoma, lymphoblastoma, and lymphosarcoma. He concludes that it must be considered a simple lymphoma of the conjunctiva. He notes the superiority of radiotherapy over excision and recalls that X rays were first used in the treatment of this tumor by Van Duyse in 1905. (5 figures, 54 references)

Phillips Thygeson.

Ellis, R. A., and Scheie, H. G. **Regression of metastatic lesions of breast carcinoma following sterilization.** A.M.A. Arch. Ophth. **48**:455-459, Oct., 1952.

Two patients with metastatic breast carcinoma showed regression of the lesions after sterilization by X ray. Both had metastatic lesions of the choroid. In the first patient the eye containing the metastases was enucleated before sterilization. Remarkable clearing of metastatic lung nodules occurred after X-ray sterilization. Two years later nodules in the lung were again found coincident with a reactivity of estrogenic function. A second

course of radiation did not alter the course of the disease so that testosterone therapy was started. The remaining eye was normal three years after initial sterilization.

Because of this experience a second patient with widespread metastatic breast carcinoma and bilateral choroidal metastasis was subjected to sterilization. The choroidal as well as extraocular lesions resolved after exposure to sterilizing doses of X ray. About six months after sterilization, however, a relapse occurred which could not be controlled with testosterone and the patient died. During the six-months period of regression the patient regained normal vision in one eye and enjoyed an almost symptomless last few months of life. (3 figures, 3 references)

George S. Tyner.

Feinstein, A. R., and Krause, A. C. **Ocular involvement in lymphomatous disease.** A.M.A. Arch. Ophth. **48**:328-337, Sept., 1952.

In the past, lymphomatous disease of the eye has been considered as an isolated lesion. More recently it has been recognized as part of a lymphomatous dissemination. The authors analyze the reported cases. This survey indicates that isolated lymphoma of the eye or its adnexa must be regarded as a potentially generalized lesion, even though systemic spread may not occur for many years. Five new cases of lymphoma of the eye seen at the University of Chicago Clinics in the past six years are reported. Roentgen-ray therapy is advocated as the treatment of choice.

R. W. Danielson.

Nadbath, R. P., and Bullwinkel, H. G. **Coexistence of intraocular melanoma and lymphatic leukemia.** A.M.A. Arch. Ophth. **48**:349-351, Sept. 1952.

The authors describe a patient in the U. S. Naval Hospital in Philadelphia, a 52-year-old man, who had intraocular melanoma and lymphatic leukemia. A review of the literature failed to reveal a similar case.

R. W. Danielson.

Reese, A. B. **The association of uveal nevi with skin nevi.** Tr. Am. Ophth. Soc. **49**:47-57, 1951.

Four cases are reported in which elevated, localized pigmented tumors occurred in the iris in association with skin nevi, mainly on the same side of the face. True nevi are a relatively common type of melanoma of the iris. When a pigmented lesion of the iris is associated with ipsilateral skin nevi it is evidence that the iris lesion belongs to the nevus group. It is quite probable that the majority never become malignant but such a lesion may take on active growth and iris nevi are more likely to become malignant than skin nevi so that it is advisable to excise them locally. Because the iris nevus is localized it can usually be excised completely. It does not give rise to disseminated tumor cells or implantation growths.

David O. Harrington.

Rossito, R. M. **X-ray therapy as treatment of palpebral epithelioma.** Arch. di Ottal. **54**:151-162, May-Aug., 1950.

In 18 cases palpebral epitheliomas were treated with X-ray therapy and kept under observation for 15 to 20 months. In superficial lesions, good results were obtained; when the lesions extended into deeper structures success was limited or doubtful. (28 references)

John J. Stern.

17
INJURIES

Nonay, T., Korchmáros, I., Nagy, F., Nécsei, P., Németh, B., Váry, I., Bohár, A., Fehér, M., Holló, I., Hudomel, J., Ludvig, I., Molnár É., Molnár, K., Varga, P., and Véli, M. **Report on 6,348 traumatic injuries of the globe.** Szemészet **3**:97-118, 1952.

In this report of 6,348 injuries, superficial, blunt, penetrating injuries, burns and corrosions, are separately dealt with. Statistics calculated from various points of view are not only informative regarding the distribution, circumstances, and sequels of injuries, but make possible certain useful conclusions. Rules and indications of therapeutic procedures are decisively stressed. The procedures applied by the authors are discussed on the basis of examples. The results of various approaches aiming at the removal of foreign bodies are compared; the comparison points to the importance of X-ray localisation. The experiments made with heating in order to render intraocular metallic foreign bodies harmless are mentioned. The material and the results are compared with that of previous years. Finally, brief advice is given in order to attain further improvement of therapeutic results. Gyula Lugossy.

Smith, B. **Early wounds in and about the orbit.** Tr. Am. Ophth. Soc. **49**:673-723, 1951.

Treatment of orbital wounds should follow an evaluation of conclusions drawn from inspection, palpation, auscultation, subjective tests and X-ray studies. Shock, hemorrhage, nutrition and infection influence the timing of surgery and the anesthesia used. The interval between injury and surgery determines whether primary, delayed primary, or secondary closure is used. Early wound closure permits conservation of tissue and the only permissible debridement is removal of necrotic tissue and globe fragments. Prolonged open treatment of orbital wounds causes excessive scar formation, prolongs disability and increases deformity. Cavernous sinus thrombosis, exophthalmos, pulsating exophthalmos, enophthalmos, muscle paralysis, foreign bodies and fractures complicate orbital wounds.

David O. Harrington.

18

SYSTEMIC DISEASE AND PARASITES

Bocci, G. **Two cases of the ocular complications of Hansen's disease.** Boll. d'ocul. **31**:361-373, June, 1952.

A 38-year-old man developed, in the course of an early cutaneous lepra infection, elevated areas along both upper parts of the limbus of each eye with slight hyperemia and formation of whitish dots. Ziehl-Nielsen staining revealed the presence of lepra bacilli in these places. In the other patient, a 36-year-old soldier, the lesions had been mistaken for a neurofibromatosis of Recklinghausen. He was seen, in the University Eye Clinic of Siena, because of his madarosis and nodules on the eyelids. These nodules, on histologic examination, looked like tuberculous, syphilitic, or sarcoid lesions, but had more varied cellular components. The nasal mucosa contained Hansen bacilli. (5 figures, 1 in color, 40 references)

K. W. Ascher.

Chamberlain, W. P., Jr. **Ocular findings in scrub typhus.** A.M.A. Arch. Ophth. **48**:313-321, Sept., 1952.

Scrub typhus, tsutsugamushi fever, or Japanese river fever, is a mite-borne acute febrile disease caused by the Rickettsia orientalis and is endemic in the Pacific Islands. Ocular complications were first reported in 451 patients in Burma by Scheie. Chamberlain reports 10 cases with ocular lesions in 150 patients with scrub typhus in New Guinea.

The ocular complications may occur in 1. the adnexa and external tissues of the eye; 2. the iris and anterior segment of the globe proper, and 3; the posterior segment, particularly the retina and optic nerve.

The most extensive lesion of the adnexa occurs when the mite bites the eyelids, causing ulcers and regional adenopathy. Two cases of severe bilateral irido-

cyclitis are reported. The most frequent manifestation in the posterior segment of the globe was edema of the optic nerve and adjacent retina. The nerve heads are usually not appreciably raised, although one or two diopters of elevation may be seen. There is an associated enlargement of the blind spot which is roughly proportional to the severity of edema.

R. W. Danielson.

Lewis, Nancy. **Case notes: Ocular pathology in a case of xanthomatous biliary cirrhosis with intra-ocular involvement.** Brit. J. Ophth. **36**:325-327, June, 1952.

This is a follow-up of a case previously reported, with pathologic findings. The patient died of pulmonary edema. Extensive hemorrhages were found in many organs. In the sections of the eyes xanthoma cells were present in the retina and choroid as well as at the periphery of the granulation tissue. The center of the mass was occupied by cholesterin crystals. Sections showed all changes of primary essential xanthomatosis.

Orwyn H. Ellis.

Stockwell, Eunice. **Visual defects in the deaf child.** A.M.A. Arch. Ophth. **48**:428-432, Oct., 1942.

This is an analysis of the ophthalmologic findings during a 10-year period from data obtained during physical examinations of pupils at the Pennsylvania School for the Deaf in Philadelphia. The incidence of refractive errors is higher in deaf than hearing children. Pigmentary degeneration of the retina was the most frequent pathologic defect. It occurred in 23 of 960 children. (8 references)

George S. Tyner.

Wise, George N. **Ocular periarteritis nodosa.** A.M.A. Arch. Ophth. **48**:1-11, July, 1952.

Two cases of periarteritis nodosa, proved at autopsy, are reported. In each case the presenting symptoms were ocular pain and irritation due to rodent corneal ulcers. In both there was an associated uveitis with discrete choroidal lesions.

A review of the literature and a discussion of the systemic as well as the ocular signs of the disease is included. The most frequent ocular signs are those of hypertensive, angiospastic retinopathy of renal disease. Periarteritis nodosa is a widespread inflammatory disease resulting in degenerative and proliferative changes in the walls of the medium and small arteries. Death is due to failure of one or more essential organs. The disease occurs most frequently in men in the middle of life.

George S. Tyner.

19

CONGENITAL DEFORMITIES, HEREDITY

Di Ferdinando, R. **Congenital malformations due to rubeola and parotitis of the mother.** Boll. d'ocul. **30**:427-441, July, 1952.

A full-term girl whose mother had had rubeola during the first month of pregnancy showed complete cataract of the right eye and retinosis and optic nerve atrophy of the left. The child was underdeveloped, her heart was enlarged and systolic murmurs were heard. Later, a moderate enlargement of the spleen and skin hemorrhages developed. While the cataract responded well to a discission performed at the age of six months, deafness was detected. Nystagmus and divergent strabismus were noted eventually. A boy born of a mother who had had parotitis during the first month of pregnancy showed a unilateral microphthalmos with cataract; the other eye was normal. (39 references)

K. W. Ascher.

Escajadillo, Thomas. **Genetic factors in ophthalmology.** Rev. peruana otorrinolar-

ing. y oftal. **2**:3-19, July-Dec., 1951.

The existence of ocular affections transmitted by heredity has been recognized since remote times. Egyptian papyrus from 1,500 years B.C., for instance, refer to night blindness. Galen recognized the congenital nature of some forms of lagophthalmos, individualized hyperopia and myopia and recommended juice of goat's liver for night blindness. It was observed after the revival of genetics that pathologic traits followed Mendelian laws. Many ophthalmologists have contributed observations of importance in genetics. Hereditary eye affections of a dominant character are ectopia lentis, cataract, glaucoma, refractive errors, ptosis, night blindness, and keratoconus; retinitis pigmentosa, microphthalmia, anophthalmia, albinism, strabismus, and achromatopsia are recessive. Color-blindness is the outstanding example of sex-linked heredity. (9 references) Roberto Buxedo.

Igersheimer, J. **The relationship of lenticular changes to mongolism.** Tr. Am. Ophth. Soc. **49**:595-624, 1951.

The eyes of 125 mongoloid idiots were examined with the slitlamp. Typical lens changes were not present before the age of 6 years, were rare between 6 and 10, frequent between 10 and 15 and almost constant after 16. The lens changes consisted of cerulean punctate opacities occasionally combined with coarser opacities. Fifty control cases of various types of feeble-mindedness were examined. The first manifestations of cataractous change were punctate opacities in the cortex and there was a mild progression. The various theories of the etiology of mongolism are reviewed. The homogenous character of the mongoloid features in general and of the lens opacities point to the germ cell as the site where the abnormality originates. David O. Harrington.

Saltzman, S. L., and Gaynin, H. T. **Atypical coloboma of choroid with dysplasia of macula: report of a case.** A.M.A. Arch. Ophth. **47**:159-166, Feb., 1952.

The fundus of the left eye of a 24-year-old woman is described because of its unusual appearance. A black and white, and a colored drawing of the fundus and the visual field chart are provided. The authors believe this condition to be a prenatal malformation resulting from fetal inflammation. George S. Tyner.

20

HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Dávila, Mauricio. **The evolution of the organ of sight through the animal scale.** Rev. peruana otorrinolaring. y oftal. **2**:23-31, July-Dec., 1951.

The author discusses schematically the evolution of the complex human being from the unicellular organisms, and how cells become grouped together to become sensitive to specific stimuli such as light, sound, touch, and heat, and then, in more detail, the evolution of the organ of sight from the most rudimentary in the lower forms of life. (20 figures, references) Roberto Buxedo.

Sorsby, Arnold. **Postage stamps of ophthalmological interest.** Brit. J. Ophth. **36**:330, June, 1952.

Postage stamps are exhibited which display portrait figures of two practicing ophthalmologists and four scientists who have directly or indirectly contributed greatly to ophthalmology, and two practicing ophthalmologists who have gained distinction in other spheres of life. (1 figure, 4 references) Orwyn H. Ellis.

NEWS ITEMS

Edited by DONALD J. LYLE, M.D.
601 Union Trust Building, Cincinnati 2

News items should reach the editor by the 12th of the month but, to receive adequate publicity, notices of postgraduate courses, meetings, and so forth should be received at least three months before the date of occurrence.

DEATHS

Dr. James Gilliam Johnston, Charlotte, North Carolina, died October 6, 1952, aged 80 years.

Dr. Paul Lux, Kansas City, Missouri, died September 20, 1952, aged 67 years.

Dr. Charles Bramman Meding, New York, New York, died October 15, 1952, aged 86 years.

Dr. Edward Louis Perry, Middleboro, Massachusetts, died September 23, 1952, aged 55 years.

Dr. George Hull Shuman, Pittsburgh, Pennsylvania, died September 3, 1952, aged 68 years.

Dr. Alva Boyd Sowers, Chicago, Illinois, died August 31, 1952, aged 68 years.

COMING EVENTS

In a forthcoming issue of the AMERICAN JOURNAL OF OPHTHALMOLOGY will appear an important article by Dr. Necdet Sezer of Istanbul. Dr. Sezer has apparently succeeded in isolating a virus as the cause of Behçet's disease.

CORRECTIONS

Attention is drawn to the following corrections in the references for the paper, "Retrolental fibroplasia: A survey," by Leona Zacharias, appearing in the JOURNAL, **35**:1426-1454 (Oct.) 1952.

11. Benabridge, B. A.: Tr. Ophth. Soc. U. Kingdom, **71**:605-608, 1951.

24. Campbell, F. W.: Tr. Ophth. Soc. U. Kingdom, **71**:287-300, 1951.

27. Chapple, C. C.: In discussion on Kinsey, V. E.: Present status of retrolental fibroplasia. Arch. Ophth., **44**:749-753 (Nov.) 1950.

32. Cohen, S., DeMetry, J. P., and Herrmann, H.: Resistance of red cells to dialuric acid of premature infants with retrolental fibroplasia. Proc. Soc. Exper. Biol. & Med., **77**:134-135 (May) 1951.

38. Coxon, M. W.: Tr. Ophth. Soc. U. Kingdom, **71**:591-598, 1951.

42. ———: The problem of retrolental fibroplasia in the city of Birmingham. Tr. Ophth. Soc. U. Kingdom, **71**:609-612, 1951.

92. Houlton, A. G. L.: Tr. Ophth. Soc. U. Kingdom, **71**:583-590, 1951.

99. Jackson, C. R. S.: Tr. Ophth. Soc. U. Kingdom, **71**:599-604, 1951.

MISCELLANEOUS

FREDERICK H. VERHOEFF FELLOWSHIP

The ophthalmic staff of the Massachusetts Eye and Ear Infirmary, Boston, has set up a fellowship in honor of Dr. Frederick H. Verhoeff. The support of the fellowship will come chiefly from a fund amounting at present to approximately $60,000 that has been collected by the staff. The income of this will be used to make grants for research and study at the Massachusetts Eye and Ear Infirmary. The grants will be administered by a committee chosen annually by the staff.

TO HONOR DR. POST

The staff of the Department of Ophthalmology, Washington University School of Medicine, Saint Louis, Missouri, has completed plans for the recognition of the retirement, as head of the department, of Dr. Lawrence T. Post, who has held that position for the past 20 years.

On Saturday, March 28, 1953, during the day a scientific session will be held, the contributors being Dr. Post's friends and confreres in American ophthalmology. The speakers include Dr. James H. Allen, Dr. Walter S. Atkinson, Dr. Alson E. Braley, Dr. Paul Chandler, Dr. Frederick C. Cordes, Dr. Jonas S. Friedenwald, Dr. Everett L. Goar, Dr. A. Ray Irvine, Dr. Peter Kronfeld, Dr. Donald J. Lyle, Dr. William P. McGuire, Dr. A. D. Ruedemann, and Dr. Alan C. Woods. That evening, a testimonial dinner honoring Dr. Post will be held at the Park Plaza Hotel.

On the preceding day, Friday, March 27, 1953, the Midwestern Section of the Association for Research in Ophthalmology will hold its annual scientific session at the Washington University School of Medicine. Also, on the night of March 27th, the Saint Louis Ophthalmic Society will have Dr. Lawrence T. Post as its honor guest and he will deliver the paper of the evening.

All those who are interested are cordially invited to attend either the scientific session or the dinner, or both. Those planning to attend the dinner are requested to make reservations well in advance through the departmental secretary, Department of Ophthalmology, Washington University School of Medicine, 640 South Kingshighway Boulevard, Saint Louis 10, Missouri.

OCULAR RESEARCH UNIT MEETING

A meeting of military and civilian consultants of the Ocular Research Unit was held at Walter Reed Army Medical Center on December 12th. The meeting was conducted by Col. J. H. King, Jr., director of the unit.

The unit was formed in 1948 under the Medical Research and Development Board of the Office of the Army Surgeon General to conduct research projects on problems of eye injuries and diseases. In September, 1951, as a result of increased eye

injuries in the Korean conflict, the research work was accelerated and a staff was assigned to Walter Reed Army Medical Center to coördinate the projects. Certain phases of the unit's research are underway at other Army and civilian hospitals throughout the country.

At the meeting progress reports were made by unit staff members, followed by discussions and suggestions by civilian consultants.

Among the civilian constulants attending the meeting were three members of the American Board of Ophthalmology: Dr. Algernon Reese, New York; Dr. Phillips Thygeson, San Jose, California; and Dr. Derrick Vail, Chicago.

Others to attend were Dr. Harold G. Scheie, Philadelphia; Dr. Trygve Gundersen, Boston; Dr. Joseph A. C. Wadsworth, New York; Dr. Alfred A. J. Den and Dr. M. Noel Stow, both of Washington, D.C.

Military ophthalmologists in attendance were Col. Arnold A. Albright, Percy Jones Army Hospital, Battle Creek, Michigan; Col. William Sichi, Brooke Army Hospital, San Antonio, Texas; Lieut. Col. F. E. Hull, Letterman Army Hospital, San Francisco; Maj. James McGraw, Army Medical Research Laboratory, Fort Knox, Kentucky; Maj. Worthy W. McKinney, U. S. Military Academy, West Point; and Walter Reed staff members Maj. J. R. Fair, Maj. R. L. Forrest, and Capt. G. A. Levi.

Second Thigpen lecture

Dr. Thomas D. Allen, Chicago, delivered the second annual Thigpen Lecture at the Medical College of Alabama, Birmingham, on December 19th. The subject of Dr. Allen's address was "Preglaucoma."

Announcement

Symposium on retinal diseases

The Department of Ophthalmology, College of Medicine, State University of Iowa, Iowa City, Iowa, is sponsoring a Symposium on Retinal Diseases, to be held in Room 405, University Hospital, Iowa City, on March 30th and 31st. The following subjects will be presented:

"Molecular basis of visual excitation," Dr. George Wald; "Hypertension and the changes in the fundus of the eye," Dr. Herman Elwyn; "Clinical evaluation of spasm in hypertensive retinopathies and in vascular occlusions," Dr. Henry P. Wagener; "Diabetic retinopathy," Dr. Jonas S. Friedenwald; "The etiology and classification of retinal detachment," Dr. C. L. Schepens; "The pathology of retinal detachment," Dr. Dohrmann K. Pischel.

The registration is open to ophthalmologists and the fee for the symposium is $50.00. Applications should be sent with the fee to Director of Postgraduate Studies, Room 259, Medical Laboratories Building, Iowa City, Iowa.

Societies

Midwest Research meeting

The fifth annual meeting of the Midwestern Section of the Association for Research in Ophthalmology will be held at the Oscar Johnson Institute, Elliot Auditorium, 640 South Kingshighway, Saint Louis, Missouri, on March 27, 1953, beginning at 9:00 A.M. The Midwestern Section encompasses the states of Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North and South Dakota, and Wisconsin.

Egypt society celebrates 50th anniversary

The Ophthalmological Society of Egypt will celebrate its 50th anniversary during its annual general meeting to be held in Cairo in the latter half of February, 1953.

The following doctors of repute will assist in this event, with the members of the society, by lecturing, demonstrating techniques, and performing new operations:

Dr. David C. Cogan, Boston; Prof. Dr. Karl Lindner, Vienna; Mr. Keith Lyle, London; Prof. Dr. Louis Paufique, Lyon, France; Prof. Dr. R. Thiel, Frankfort, Germany; Dr. Phillips Thygeson, San Jose, California. Each of these guests will deliver three lectures, and 20 subjects for general discussion will be submitted by them.

Representatives of all medical societies and of universities are cordially invited to partake in this event, and colleagues from all over the world are welcomed to subscribe.

For further inquiries please communicate with:
Dr. Mohammad Khalil, hon. secretary,
15 A Sherif Pasha, Str.
Cairo, Egypt.

Reading meeting

The 129th meeting of the Reading Eye, Ear, Nose, and Throat Society was held on November 19th with approximately 60 physicians in attendance. Dr. Isadore Givner, New York, presented an illustrated lecture on the subject of "Associated eye and skin manifestations of systemic disease." A study club was conducted on the subject of "External otitis." Dr. Philip R. Wiest, Reading, was the moderator. Instructors were: Dr. Michael J. Penta, Reading; Dr. C. Fremont Hall, Phoenixville.

Personals

Dr. E. G. Gill addressed the New Jersey Ophthalmological Society at Princeton, New Jersey, on December 4th. He gave an illustrated talk on "Recent advances in cataract surgery."

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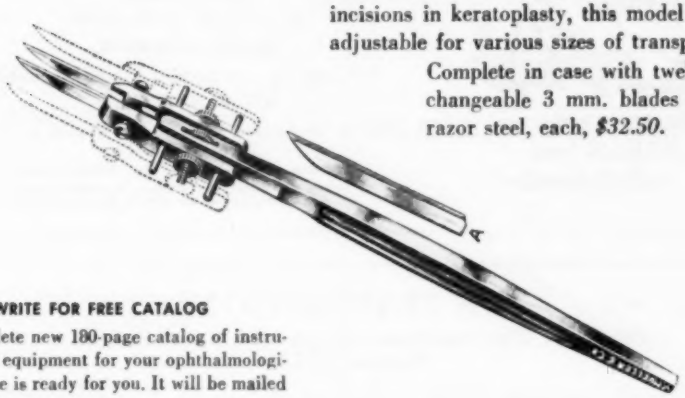

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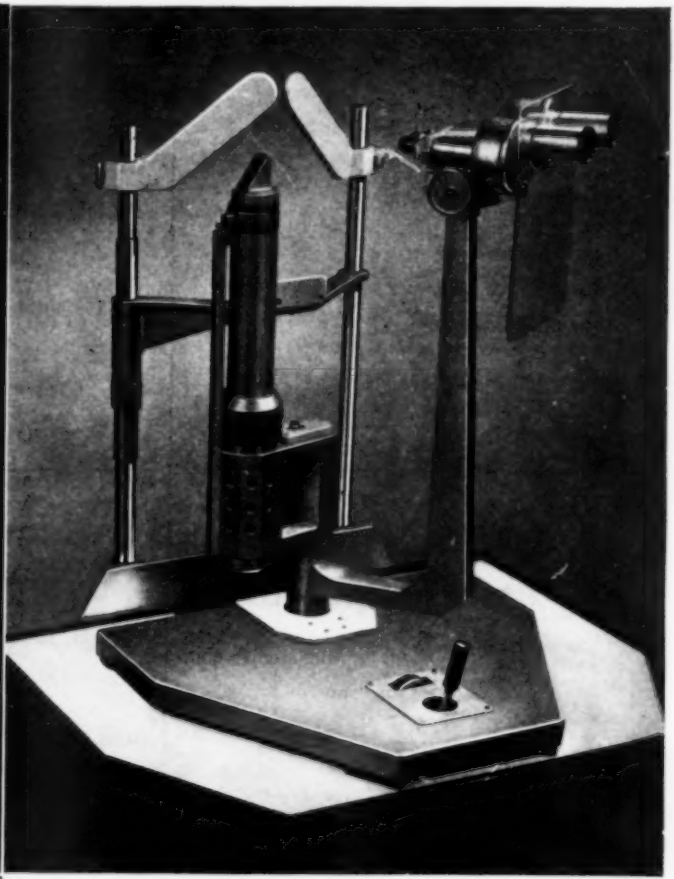

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N.B.: Owing to printers error the range of observation and illumination was incorrectly given as 10° instead of 180° in our advertisement published in the November number.

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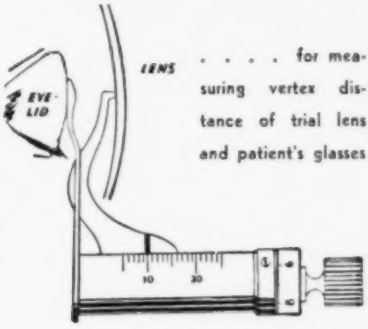

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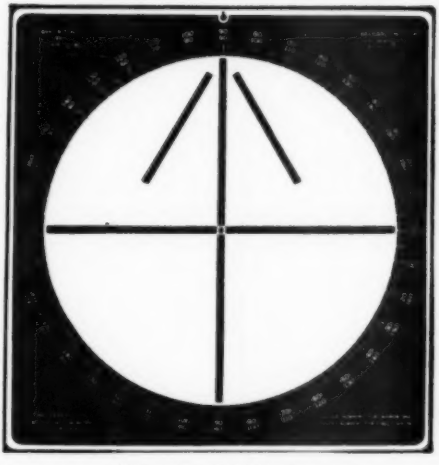

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3. It is stocked in 16½ mm., 17½ mm., and 19 mm. sizes. Special sizes can be made upon request to accommodate any unusual socket conditions.
4. Monoplex Eyes are easily fitted to this implant as well as to all other orbital implants.

An Operative Procedure used in conjunction with the Monoplex Buried Implant, written by Albert N. Lemoine, Jr., M. D., is available upon request.

American Optical Company
MONOPLEX DIVISION

Fig. 1 *The Monoplex Buried Implant, in methyl-methacrylate or Kel-F, can be furnished with flat or gently rounded anterior surface.*

Fig. 2 *Fine tantalum mesh covers anterior surface. Grooves in surface provide passage for needles when suturing recti muscles to mesh.*